The Comprehensive LaTeX Symbol List

Scott Pakin <scott+clsl@pakin.org>*

22 September 2005

Abstract

This document lists 3300 symbols and the corresponding LaTeX commands that produce them. Some of these symbols are guaranteed to be available in every LaTeX 2ε system; others require fonts and packages that may not accompany a given distribution and that therefore need to be installed. All of the fonts and packages used to prepare this document—as well as this document itself—are freely available from the Comprehensive TeX Archive Network (http://www.ctan.org/).

Contents

1 Introduction **6**
1.1 Document Usage . . . 6
1.2 Frequently Requested Symbols . . . 6

2 Body-text symbols **7**
Table 1: LaTeX 2ε Escapable "Special" Characters . . . 7
Table 2: Predefined LaTeX 2ε Text-mode Commands . . . 7
Table 3: LaTeX 2ε Commands Defined to Work in Both Math and Text Mode . . . 7
Table 4: $\mathcal{AMS}$ Commands Defined to Work in Both Math and Text Mode . . . 7
Table 5: Non-ASCII Letters (Excluding Accented Letters) . . . 8
Table 6: Letters Used to Typeset African Languages . . . 8
Table 7: Letters Used to Typeset Vietnamese . . . 8
Table 8: Punctuation Marks Not Found in OT1 . . . 8
Table 9: pifont Decorative Punctuation Marks . . . 8
Table 10: tipa Phonetic Symbols . . . 9
Table 11: tipx Phonetic Symbols . . . 10
Table 13: wsuipa Phonetic Symbols . . . 10
Table 14: wasysym Phonetic Symbols . . . 11
Table 15: phonetic Phonetic Symbols . . . 11
Table 16: t4phonet Phonetic Symbols . . . 12
Table 17: semtrans Transliteration Symbols . . . 12
Table 18: Text-mode Accents . . . 12
Table 19: tipa Text-mode Accents . . . 12
Table 20: extraipa Text-mode Accents . . . 14
Table 21: wsuipa Text-mode Accents . . . 14
Table 22: phonetic Text-mode Accents . . . 14
Table 23: metre Text-mode Accents . . . 15
Table 24: t4phonet Text-mode Accents . . . 15
Table 25: arcs Text-mode Accents . . . 15
Table 26: semtrans Accents . . . 15
Table 27: wsuipa Diacritics . . . 15
Table 28: textcomp Diacritics . . . 16
Table 29: textcomp Currency Symbols . . . 16
Table 30: marvosym Currency Symbols . . . 16

*The original version of this document was written by David Carlisle, with several additional tables provided by Alexander Holt. See Section 7.6 on page 78 for more information about who did what.

Table 31: wasysym Currency Symbols . . . 16
Table 32: eurosym Euro Signs . . . 16
Table 33: textcomp Legal Symbols . . . 17
Table 34: cclicenses Creative Commons License Icons . . . 17
Table 35: textcomp Old-style Numerals . . . 17
Table 36: Miscellaneous textcomp Symbols . . . 18
Table 37: Miscellaneous wasysym Text-mode Symbols . . . 18

3 Mathematical symbols **19**
Table 38: Math-Mode Versions of Text Symbols . . . 19
Table 39: Binary Operators . . . 19
Table 40: $\mathcal{AMS}$ Binary Operators . . . 19
Table 41: stmaryrd Binary Operators . . . 20
Table 42: wasysym Binary Operators . . . 20
Table 43: txfonts/pxfonts Binary Operators . . . 20
Table 44: mathabx Binary Operators . . . 21
Table 45: ulsy Geometric Binary Operators . . . 21
Table 46: mathabx Geometric Binary Operators . . . 21
Table 47: Variable-sized Math Operators . . . 21
Table 48: $\mathcal{AMS}$ Variable-sized Math Operators . . . 22
Table 49: stmaryrd Variable-sized Math Operators . . . 22
Table 50: wasysym Variable-sized Math Operators . . . 22
Table 51: mathabx Variable-sized Math Operators . . . 23
Table 52: txfonts/pxfonts Variable-sized Math Operators . . . 24
Table 53: esint Variable-sized Math Operators . . . 25
Table 54: Binary Relations . . . 25
Table 55: $\mathcal{AMS}$ Binary Relations . . . 25
Table 56: $\mathcal{AMS}$ Negated Binary Relations . . . 26
Table 57: stmaryrd Binary Relations . . . 26
Table 58: wasysym Binary Relations . . . 26
Table 59: txfonts/pxfonts Binary Relations . . . 26
Table 60: txfonts/pxfonts Negated Binary Relations . . . 26
Table 61: mathabx Binary Relations . . . 27
Table 62: mathabx Negated Binary Relations . . . 27
Table 63: trsym Binary Relations . . . 27
Table 64: trfsigns Binary Relations . . . 27
Table 65: Subset and Superset Relations . . . 28
Table 66: $\mathcal{AMS}$ Subset and Superset Relations . . . 28
Table 67: stmaryrd Subset and Superset Relations . . . 28
Table 68: wasysym Subset and Superset Relations . . . 28
Table 69: txfonts/pxfonts Subset and Superset Relations . . . 28
Table 70: mathabx Subset and Superset Relations . . . 28
Table 71: Inequalities . . . 29
Table 72: $\mathcal{AMS}$ Inequalities . . . 29
Table 73: wasysym Inequalities . . . 29
Table 74: txfonts/pxfonts Inequalities . . . 29
Table 75: mathabx Inequalities . . . 30
Table 76: $\mathcal{AMS}$ Triangle Relations . . . 30
Table 77: stmaryrd Triangle Relations . . . 30
Table 78: mathabx Triangle Relations . . . 30
Table 79: Arrows . . . 31
Table 80: Harpoons . . . 31
Table 81: textcomp Text-mode Arrows . . . 31
Table 82: $\mathcal{AMS}$ Arrows . . . 31
Table 83: $\mathcal{AMS}$ Negated Arrows . . . 31
Table 84: $\mathcal{AMS}$ Harpoons . . . 31
Table 85: stmaryrd Arrows . . . 32
Table 86: txfonts/pxfonts Arrows . . . 32

Table 87: mathabx Arrows . . . 32
Table 88: mathabx Negated Arrows . . . 32
Table 89: mathabx Harpoons . . . 33
Table 90: chemarrow Arrows . . . 33
Table 91: ulsy Contradiction Symbols . . . 33
Table 92: Extension Characters . . . 33
Table 93: stmaryrd Extension Characters . . . 33
Table 94: txfonts/pxfonts Extension Characters . . . 33
Table 95: mathabx Extension Characters . . . 33
Table 96: Log-like Symbols . . . 34
Table 97: $\mathcal{AMS}$ Log-like Symbols . . . 34
Table 98: Greek Letters . . . 34
Table 99: $\mathcal{AMS}$ Greek Letters . . . 34
Table 100: txfonts/pxfonts Upright Greek Letters . . . 35
Table 101: upgreek Upright Greek Letters . . . 35
Table 102: txfonts/pxfonts Variant Latin Letters . . . 35
Table 103: $\mathcal{AMS}$ Hebrew Letters . . . 35
Table 104: Letter-like Symbols . . . 35
Table 105: $\mathcal{AMS}$ Letter-like Symbols . . . 36
Table 106: txfonts/pxfonts Letter-like Symbols . . . 36
Table 107: mathabx Letter-like Symbols . . . 36
Table 108: trfsigns Letter-like Symbols . . . 36
Table 109: $\mathcal{AMS}$ Delimiters . . . 36
Table 110: stmaryrd Delimiters . . . 36
Table 111: mathabx Delimiters . . . 36
Table 112: nath Delimiters . . . 36
Table 113: Variable-sized Delimiters . . . 37
Table 114: Large, Variable-sized Delimiters . . . 37
Table 115: $\mathcal{AMS}$ Variable-sized Delimiters . . . 37
Table 116: stmaryrd Variable-sized Delimiters . . . 37
Table 117: mathabx Variable-sized Delimiters . . . 38
Table 118: nath Variable-sized Delimiters (Double) . . . 38
Table 119: nath Variable-sized Delimiters (Triple) . . . 38
Table 120: textcomp Text-mode Delimiters . . . 39
Table 121: metre Text-mode Delimiters . . . 39
Table 122: Math-mode Accents . . . 39
Table 123: $\mathcal{AMS}$ Math-mode Accents . . . 39
Table 124: yhmath Math-mode Accents . . . 39
Table 125: trfsigns Math-mode Accents . . . 39
Table 126: Extensible Accents . . . 40
Table 127: overrightarrow Extensible Accents . . . 40
Table 128: yhmath Extensible Accents . . . 40
Table 129: $\mathcal{AMS}$ Extensible Accents . . . 40
Table 130: empheq Extensible Accents . . . 41
Table 131: chemarr Extensible Accents . . . 41
Table 132: chemarrow Extensible Accents . . . 41
Table 133: mathabx Extensible Accents . . . 42
Table 134: esvect Extensible Accents . . . 42
Table 135: undertilde Extensible Accents . . . 42
Table 136: extarrows Extensible Accents . . . 42
Table 137: holtpolt Non-commutative Division Symbols . . . 43
Table 138: Dots . . . 43
Table 139: $\mathcal{AMS}$ Dots . . . 43
Table 140: mathdots Dots . . . 43
Table 141: yhmath Dots . . . 43
Table 142: mathcomp Math Symbols . . . 43
Table 143: mathabx Mayan Digits . . . 43

Table 144: marvosym Math Symbols . . . 44
Table 145: Miscellaneous LaTeX 2ε Math Symbols . . . 44
Table 146: Miscellaneous AMS Math Symbols . . . 44
Table 147: Miscellaneous wasysym Math Symbols . . . 44
Table 148: Miscellaneous txfonts/pxfonts Math Symbols . . . 44
Table 149: Miscellaneous mathabx Math Symbols . . . 45
Table 150: Miscellaneous textcomp Text-mode Math Symbols . . . 45
Table 151: Math Alphabets . . . 46

4 Science and technology symbols **47**
Table 152: gensymb Symbols Defined to Work in Both Math and Text Mode . . . 47
Table 153: wasysym Electrical and Physical Symbols . . . 47
Table 154: ifsym Pulse Diagram Symbols . . . 47
Table 155: ar Aspect Ratio Symbol . . . 47
Table 156: textcomp Text-mode Science and Engineering Symbols . . . 47
Table 157: wasysym Astronomical Symbols . . . 48
Table 158: marvosym Astronomical Symbols . . . 48
Table 159: mathabx Astronomical Symbols . . . 48
Table 160: wasysym Astrological Symbols . . . 48
Table 161: marvosym Astrological Symbols . . . 48
Table 162: mathabx Astrological Symbols . . . 48
Table 163: wasysym APL Symbols . . . 49
Table 164: wasysym APL Modifiers . . . 49
Table 165: marvosym Computer Hardware Symbols . . . 49
Table 166: ascii Control Characters (IBM) . . . 49
Table 167: marvosym Communication Symbols . . . 49
Table 168: marvosym Engineering Symbols . . . 49
Table 169: wasysym Biological Symbols . . . 50
Table 170: marvosym Biological Symbols . . . 50
Table 171: marvosym Safety-related Symbols . . . 50

5 Dingbats **51**
Table 172: bbding Arrows . . . 51
Table 173: pifont Arrows . . . 51
Table 174: marvosym Scissors . . . 51
Table 175: bbding Scissors . . . 51
Table 176: pifont Scissors . . . 51
Table 177: dingbat Pencils . . . 51
Table 178: bbding Pencils and Nibs . . . 52
Table 179: pifont Pencils and Nibs . . . 52
Table 180: dingbat Hands . . . 52
Table 181: bbding Hands . . . 52
Table 182: pifont Hands . . . 52
Table 183: bbding Crosses and Plusses . . . 52
Table 184: pifont Crosses and Plusses . . . 52
Table 185: bbding Xs and Check Marks . . . 52
Table 186: pifont Xs and Check Marks . . . 53
Table 187: wasysym Xs and Check Marks . . . 53
Table 188: pifont Circled Numbers . . . 53
Table 189: wasysym Stars . . . 53
Table 190: bbding Stars, Flowers, and Similar Shapes . . . 53
Table 191: pifont Stars, Flowers, and Similar Shapes . . . 54
Table 192: wasysym Geometric Shapes . . . 54
Table 193: ifsym Geometric Shapes . . . 54
Table 194: bbding Geometric Shapes . . . 55
Table 195: pifont Geometric Shapes . . . 55
Table 196: universa Geometric Shapes . . . 55
Table 197: manfnt Dangerous Bend Symbols . . . 55

Table 198: skull Symbols . . . 55
Table 199: Non-Mathematical mathabx Symbols . . . 55
Table 200: marvosym Information Symbols . . . 55
Table 201: Miscellaneous dingbat Dingbats . . . 56
Table 202: Miscellaneous bbding Dingbats . . . 56
Table 203: Miscellaneous pifont Dingbats . . . 56

6 Other symbols **57**
Table 204: textcomp Genealogical Symbols . . . 57
Table 205: wasysym General Symbols . . . 57
Table 206: wasysym Circles . . . 57
Table 207: wasysym Musical Symbols . . . 57
Table 208: harmony Musical Symbols . . . 57
Table 209: harmony Musical Accents . . . 58
Table 210: Miscellaneous manfnt Symbols . . . 58
Table 211: marvosym Navigation Symbols . . . 58
Table 212: marvosym Laundry Symbols . . . 58
Table 213: Other marvosym Symbols . . . 59
Table 214: Miscellaneous universa Symbols . . . 59
Table 215: ifsym Weather Symbols . . . 59
Table 216: ifsym Alpine Symbols . . . 59
Table 217: ifsym Clocks . . . 60
Table 218: Other ifsym Symbols . . . 60
Table 219: skak Chess Informator Symbols . . . 60
Table 220: metre Metrical Symbols . . . 61
Table 221: metre Small and Large Metrical Symbols . . . 61
Table 222: phaistos Symbols from the Phaistos Disk . . . 62
Table 223: protosem Proto-Semitic Characters . . . 62
Table 224: hieroglf Hieroglyphics . . . 63
Table 225: dictsym Dictionary Symbols . . . 63

7 Additional Information **64**
7.1 Symbol Name Clashes . . . 64
7.2 Where can I find the symbol for . . . ? . . . 64
7.3 Math-mode spacing . . . 74
7.4 Bold mathematical symbols . . . 75
7.5 ASCII and Latin 1 quick reference . . . 75
7.6 About this document . . . 78
7.7 Copyright and license . . . 79

References **79**

Index **82**

1 Introduction

Welcome to the Comprehensive LaTeX Symbol List! This document strives to be your primary source of LaTeX symbol information: font samples, LaTeX commands, packages, usage details, caveats—everything needed to put thousands of different symbols at your disposal. All of the fonts covered herein meet the following criteria:

1. They are freely available from the Comprehensive TeX Archive Network (`http://www.ctan.org`).
2. All of their symbols have LaTeX 2$_\varepsilon$ bindings. That is, a user should be able to access a symbol by name, not just by `\char`⟨*number*⟩.

These are not particularly limiting criteria; the Comprehensive LaTeX Symbol List contains samples of 3300 symbols—quite a large number. Some of these symbols are guaranteed to be available in every LaTeX 2$_\varepsilon$ system; others require fonts and packages that may not accompany a given distribution and that therefore need to be installed. See `http://www.tex.ac.uk/cgi-bin/texfaq2html?label=instpackages+wherefiles` for help with installing new fonts and packages.

1.1 Document Usage

Each section of this document contains a number of font tables. Each table shows a set of symbols, with the corresponding LaTeX command to the right of each symbol. A table's caption indicates what package needs to be loaded in order to access that table's symbols. For example, the symbols in Table 35, "textcomp Old-Style Numerals", are made available by putting "`\usepackage{textcomp}`" in your document's preamble. "$\mathcal{AMS}$" means to use the $\mathcal{AMS}$ packages, viz. amssymb and/or amsmath. Notes below a table provide additional information about some or all the symbols in that table.

One note that appears a few times in this document, particularly in Section 2, indicates that certain symbols do not exist in the OT1 font encoding (Donald Knuth's original, 7-bit font encoding, which is the default font encoding for LaTeX) and that you should use fontenc to select a different encoding, such as T1 (a common 8-bit font encoding). That means that you should put "`\usepackage[`⟨*encoding*⟩`]{fontenc}`" in your document's preamble, where ⟨*encoding*⟩ is, e.g., `T1` or `LY1`. To limit the change in font encoding to the current group, use "`\fontencoding{`⟨*encoding*⟩`}\selectfont`".

Section 7 contains some additional information about the symbols in this document. It shows which symbol names are not unique across packages, gives examples of how to create new symbols out of existing symbols, explains how symbols are spaced in math mode, presents a LaTeX ASCII and Latin 1 tables, and provides some information about this document itself. The Comprehensive LaTeX Symbol List ends with an index of all the symbols in the document and various additional useful terms.

1.2 Frequently Requested Symbols

There are a number of symbols that are requested over and over again on `comp.text.tex`. If you're looking for such a symbol the following list will help you find it quickly.

␣, as in "Spaces␣are␣significant." 7
í, ì, ī, î, etc. (versus í, ì, ī, and î) 12
¢ 16
€ 16
©, ®, and ™ 17
‰ 18
⫌ 24
∴ 25
≔ and ⩴ 26
≲ and ≳ 29
⋰ 43
°, as in "180°" or "15℃" 45
$\mathscr{L}$, $\mathscr{F}$, etc. 46
ℕ, ℤ, ℝ, etc. 46
ƒ 67
a̋, è, etc. (i.e., several accents per character) 69
<, >, and | (instead of ¡, ¿, and —) 75
ˆ and ˜ (or ∼) 76

2 Body-text symbols

This section lists symbols that are intended for use in running text, such as punctuation marks, accents, ligatures, and currency symbols.

Table 1: LaTeX 2_ε Escapable "Special" Characters

$	\$	%	\%	_	_*	}	\}	&	\&	#	\#	{	\{

* The underscore package redefines "_" to produce an underscore in text mode (i.e., it makes it unnecessary to escape the underscore character).

Table 2: Predefined LaTeX 2_ε Text-mode Commands

	^	\textasciicircum			<	\textless
	~	\textasciitilde		a	a	\textordfeminine
	*	\textasteriskcentered		o	o	\textordmasculine
	\	\textbackslash			¶	\textparagraph*
	|	\textbar			·	\textperiodcentered
	{	\textbraceleft*			¿	\textquestiondown
	}	\textbraceright*			“	\textquotedblleft
	•	\textbullet			”	\textquotedblright
©	©	\textcopyright*			‘	\textquoteleft
	†	\textdagger*			’	\textquoteright
	‡	\textdaggerdbl*		®	®	\textregistered
	$	\textdollar*			§	\textsection*
	...	\textellipsis*			£	\textsterling*
	—	\textemdash		TM	™	\texttrademark
	–	\textendash			_	\textunderscore*
	¡	\textexclamdown			␣	\textvisiblespace
	>	\textgreater				

Where two symbols are present, the left one is the "faked" symbol that LaTeX 2_ε provides by default, and the right one is the "true" symbol that textcomp makes available.

* It's generally preferable to use the corresponding symbol from Table 3 because the symbols in that table work properly in both text mode and math mode.

Table 3: LaTeX 2_ε Commands Defined to Work in Both Math and Text Mode

$	\$		_	_	‡	\ddag	{	\{
¶	\P	©	©	\copyright	...	\dots	}	\}
§	\S		†	\dag	£	\pounds		

Where two symbols are present, the left one is the "faked" symbol that LaTeX 2_ε provides by default, and the right one is the "true" symbol that textcomp makes available.

Table 4: $\mathcal{AMS}$ Commands Defined to Work in Both Math and Text Mode

✓	\checkmark	®	\circledR	✠	\maltese

Table 5: Non-ASCII Letters (Excluding Accented Letters)

å	\aa	Đ	\DH*	Ł	\L	ø	\o	ß	\ss
Å	\AA	ð	\dh*	ł	\l	Ø	\O	SS	\SS
Æ	\AE	Đ	\DJ*	Ŋ	\NG*	Œ	\OE	Þ	\TH*
æ	\ae	đ	\dj*	ŋ	\ng*	œ	\oe	þ	\th*

* Not available in the OT1 font encoding. Use the fontenc package to select an alternate font encoding, such as T1.

Table 6: Letters Used to Typeset African Languages

Ɖ	\B{D}	ƈ	\m{c}	ʃ	\m{f}	ƙ	\m{k}	ţ	\M{t}	ȝ	\m{Z}
ɗ	\B{d}	Ɗ	\m{D}	Ƒ	\m{F}	Ɲ	\m{N}	Ƭ	\M{T}	Ɛ̃	\T{E}
Ħ	\B{H}	ɖ	\M{d}	Ɣ	\m{G}	ŋ	\m{n}	ƭ	\m{t}	ɛ̃	\T{e}
ħ	\B{h}	Ð	\M{D}	ɣ	\m{g}	ɔ	\m{o}	Ʈ	\m{T}	Ɔ̃	\T{O}
ŧ	\B{t}	ƈ	\m{d}	Ɩ	\m{I}	Ɔ	\m{O}	ʊ	\m{u}*	ɔ̃	\T{o}
Ŧ	\B{T}	Ɛ	\m{E}	ɩ	\m{i}	Ƥ	\m{P}	Ʊ	\m{U}*		
ɓ	\m{b}	ɛ	\m{e}	Ɲ	\m{J}	ƥ	\m{p}	Ƴ	\m{Y}		
Ɓ	\m{B}	Ǝ	\M{E}	ɲ	\m{j}	ʃ	\m{s}	ƴ	\m{y}		
Ƈ	\m{C}	ə	\M{e}	Ƙ	\m{K}	Ʃ	\m{S}	ʒ	\m{z}		

These characters all need the T4 font encoding, which is provided by the fc package.

* \m{v} and \m{V} are synonyms for \m{u} and \m{U}.

Table 7: Letters Used to Typeset Vietnamese

Ơ	\OHORN	ơ	\ohorn	Ư	\UHORN	ư	\uhorn

These characters all need the T5 font encoding, which is provided by the vntex package.

Table 8: Punctuation Marks Not Found in OT1

«	\guillemotleft	‹	\guilsinglleft	„	\quotedblbase	"	\textquotedbl
»	\guillemotright	›	\guilsinglright	‚	\quotesinglbase		

To get these symbols, use the fontenc package to select an alternate font encoding, such as T1.

Table 9: pifont Decorative Punctuation Marks

❛	\ding{123}	❝	\ding{125}	❡	\ding{161}	❣	\ding{163}
❜	\ding{124}	❞	\ding{126}	❢	\ding{162}		

TABLE 10: tipa Phonetic Symbols

ɤ	\textbabygamma	ʔ	\textglotstop	ɳ	\textrtailn
ƀ	\textbarb	ˑ	\texthalflength	ɽ	\textrtailr
ɕ	\textbarc	ъ	\texthardsign	ʂ	\textrtails
đ	\textbard	ʱ	\texthooktop	ʈ	\textrtailt
ɟ	\textbardotlessj	ɓ	\texthtb	ʐ	\textrtailz
ɠ	\textbarg	ʄ	\texthtbardotlessj	˞	\textrthook
ʡ	\textbarglotstop	ƈ	\texthtc	ʌ	\textsca
ɨ	\textbari	ɗ	\texthtd	ʙ	\textscb
ɬ	\textbarl	ɠ	\texthtg	ɛ	\textsce
ɵ	\textbaro	ɦ	\texthth	ɢ	\textscg
ʕ	\textbarrevglotstop	ʃ	\texththeng	ʜ	\textsch
ʉ	\textbaru	ƙ	\texthtk	ə	\textschwa
ɬ	\textbeltl	ƥ	\texthtp	ɪ	\textsci
β	\textbeta	ʠ	\texthtq	ʝ	\textscj
ʘ	\textbullseye	ԁ	\texthtrtaild	ʟ	\textscl
ˊ	\textceltpal	ƈ	\texthtscg	ɴ	\textscn
χ	\textchi	ƭ	\texthtt	œ	\textscoelig
ɔ	\textcloseepsilon	ʰʊ	\texthvlig	ɷ	\textscomega
ɷ	\textcloseomega	ʖ	\textinvglotstop	ʁ	\textscr
ɜ	\textcloserevepsilon	ʁ	\textinvscr	ɑ	\textscripta
ʒ	\textcommatailz	ɩ	\textiota	ɡ	\textscriptg
˥	\textcorner	λ	\textlambda	ʊ	\textscriptv
ƀ	\textcrb	ː	\textlengthmark	ᴜ	\textscu
đ	\textcrd	ɻ	\textlhookt	ʏ	\textscy
ɠ	\textcrg	ɭ	\textlhtlongi	ˌ	\textsecstress
ħ	\textcrh	ʯ	\textlhtlongy	ь	\textsoftsign
ƚ	\textcrinvglotstop	ɾ	\textlonglegr	ʗ	\textstretchc
ƛ	\textcrlambda	˂	\textlptr	ʦ	\texttctclig
ƻ	\textcrtwo	ɱ	\textltailm	ʧ	\textteshlig
ȼ	\textctc	ɲ	\textltailn	θ	\texttheta
ȡ	\textctd	ɬ	\textltilde	þ	\textthorn
ʣ	\textctdctzlig	ɮ	\textlyoghlig	|	\texttoneletterstem
ʃ	\textctesh	ɟ	\textObardotlessj	ʦ	\texttslig
ʝ	\textctj	ɮ	\textOlyoghlig	ʊ	\textturna
ɳ	\textctn	ω	\textomega	ɔe	\textturncelig
ʇ	\textctt	ˠ	\textopencorner	ɥ	\textturnh
ʧ	\textcttctclig	ɔ	\textopeno	ʞ	\textturnk
ʒ	\textctyogh	ˌ	\textpalhook	ʃ	\textturnlonglegr
ʑ	\textctz	ɸ	\textphi	ɯ	\textturnm
ʤ	\textdctzlig	|	\textpipe	ɯɻ	\textturnmrleg
ǯ	\textdoublebaresh	ˈ	\textprimstress	ɹ	\textturnr
ǂ	\textdoublebarpipe	ˀ	\textraiseglotstop	ɻ	\textturnrrtail
≠	\textdoublebarslash	ɺ	\textraisevibyi	ɒ	\textturnscripta
‖	\textdoublepipe	ɤ	\textramshorns	ʇ	\textturnt
‖	\textdoublevertline	ʻ	\textrevapostrophe	ʌ	\textturnv
↓	\textdownstep	ɘ	\textreve	ʍ	\textturnw
ʤ	\textdyoghlig	ɜ	\textrevepsilon	ʎ	\textturny
ʤ	\textdzlig	ʕ	\textrevglotstop	ʊ	\textupsilon
ɛ	\textepsilon	ʒ	\textrevyogh	↑	\textupstep
ʃ	\textesh	ɜʴ	\textrhookrevepsilon	|	\textvertline

(continued on next page)

(continued from previous page)

ɾ	\textfishhookr	ɔ˞	\textrhookschwa	ɻ	\textvibyi
g	\textg	˞	\textrhoticity	ʯ	\textvibyy
ɣ	\textgamma	˃	\textrptr	ƿ	\textwynn
↘	\textglobfall	ɖ	\textrtaild	ȝ	\textyogh
↗	\textglobrise	ɭ	\textrtaill		

tipa defines shortcut characters for many of the above. It also defines a command \tone for denoting tone letters (pitches). See the tipa documentation for more information.

Table 11: tipx Phonetic Symbols

ɶ	\textaolig	ʃ	\texthtbardotlessjvar	˔	\textrthooklong
ƹ	\textbenttailyogh	ʊ	\textinvomega	ᴔ	\textscaolig
ɣ	\textbktailgamma	ʌ	\textinvsca	ᴀ	\textscdelta
ʖ	\textctinvglotstop	ɑ	\textinvscripta	ꜰ	\textscf
ʄ	\textctjvar	ɬ	\textlfishhookrlig	ᴋ	\textsck
ʗ	\textctstretchc	ɟ	\textlhookfour	ᴍ	\textscm
ʗ	\textctstretchcvar	ɲ	\textlhookp	ᴘ	\textscp
ʞ	\textctturnt	ɪ	\textlhti	ǫ	\textscq
ȸ	\textdblig	ɺ	\textlooptoprevesh	←	\textspleftarrow
ǂ	\textdoublebarpipevar	ŋ	\textnrleg	ȼ	\textstretchcvar
‖	\textdoublepipevar	⊙	\textObullseye	↔	\textsubdoublearrow
↓	\textdownfullarrow	˩	\textpalhooklong	→	\textsubrightarrow
♀	\textfemale	ʲ	\textpalhookvar	þ	\textthornvari
ɲ	\textfrbarn	|	\textpipevar	þ	\textthornvarii
ɗ	\textfrhookd	ɋ	\textqplig	þ	\textthornvariii
ɗ	\textfrhookdvar	▯	\textrectangle	þ	\textthornvariv
ƭ	\textfrhookt	ꟷ	\textretractingvar	ɾ	\textturnglotstop
ɣ	\textfrtailgamma	ɹ	\textrevscl	ʞ	\textturnsck
ʔ	\textglotstopvari	ʁ	\textrevscr	∩	\textturnscu
ʔ	\textglotstopvarii	ɑ̢	\textrhooka	ɛ	\textturnthree
ʔ	\textglotstopvariii	e̢	\textrhooke	ƻ	\textturntwo
ɣ	\textgrgamma	ɛ̢	\textrhookepsilon	♀	\textuncrfemale
ɧ	\textheng	ɤ̢	\textrhookopeno	↑	\textupfullarrow
ɱ	\texthmlig	ʃ̢	\textrtailhth		

Table 13: wsuipa Phonetic Symbols

ɤ	\babygamma	ŋ	\eng	ɱ	\labdentalnas	ə	\schwa
ƀ	\barb	ɔ˞	\er	ɬ	\latfric	ɪ	\sci
đ	\bard	ʃ	\esh	ɯ̨	\legm	ɴ	\scn
ɨ	\bari	ð	\eth	ɾ	\legr	ʀ	\scr
ɬ	\barl	ɾ	\flapr	ɮ	\lz	ɑ	\scripta

(continued on next page)

(continued from previous page)

ɵ	\baro	ʔ	\glotstop	ɑ	\nialpha	ɡ	\scriptg
ᵽ	\barp	ɓ	\hookb	β	\nibeta	ʋ	\scriptv
ɨ	\barsci	ƈ	\hookd	χ	\nichi	ᴜ	\scu
ᵾ	\barscu	ɠ	\hookg	ɛ	\niepsilon	ʏ	\scy
ʉ	\baru	ɦ	\hookh	ɣ	\nigamma	ⱱ	\slashb
⊙	\clickb	ɧ	\hookheng	ɩ	\niiota	ⱸ	\slashc
ǀ	\clickc	ɜ˞	\hookrevepsilon	ʎ	\nilambda	ⱨ	\slashd
ǂ	\clickt	ʰʊ	\hv	ω	\niomega	ⱶ	\slashu
ɷ	\closedniomega	ɐ	\inva	ɸ	\niphi	ᶁ	\taild
ɞ	\closedrevepsilon	ʇ	\invf	σ	\nisigma	ɻ	\tailinvr
ƀ	\crossb	ʕ	\invglotstop	θ	\nitheta	ɭ	\taill
đ	\crossd	ʯ	\invh	ʊ	\niupsilon	ɳ	\tailn
ħ	\crossh	ɻ	\invlegr	ɲ	\nj	ɽ	\tailr
ƛ	\crossnilambda	ɯ	\invm	œ	\oo	ʂ	\tails
ɕ	\curlyc	ɹ	\invr	ɔ	\openo	ʈ	\tailt
ʃ	\curlyesh	ʁ	\invscr	ɘ	\reve	ᶎ	\tailz
ʒ	\curlyyogh	ɒ	\invscripta	ʕ	\reveject	ʧ	\tesh
ʑ	\curlyz	ʌ	\invv	ɜ	\revepsilon	þ	\thorn
ɬ	\dlbari	ʍ	\invw	ʕ	\revglotstop	ŧ	\tildel
ʤ	\dz	ʎ	\invy	ᴅ	\scd	ʒ	\yogh
ʔ	\ejective	ɣ	\ipagamma	ɢ	\scg		

Table 14: wasysym Phonetic Symbols

Ð	\DH	ð	\dh	ɔ	\openo
Þ	\Thorn	ə	\inve	þ	\thorn

Table 15: phonetic Phonetic Symbols

ɟ	\barj	ɾ	\flap	ɨ	\ibar	ɒ	\rotvara	ɪ	\vari
ƛ	\barlambda	ʔ	\glottal	ɔ	\openo	ʍ	\rotw	ɷ	\varomega
ŋ	\emgma	Ɓ	\hausaB	ħ	\planck	ʎ	\roty	ɔ	\varopeno
ŋ	\engma	ɓ	\hausab	ʌ	\pwedge	ə	\schwa	ɣ	\vod
ɲ	\enya	ɗ	\hausad	Ɖ	\revD	þ	\thorn	ɦ	\voicedh
ɛ	\epsi	Ɗ	\hausaD	ɹ	\riota	ʉ	\ubar	ʒ	\yogh
ʃ	\esh	ƙ	\hausak	ɯ	\rotm	ɥ	\udesc		
ð	\eth	Ƙ	\hausaK	ʊ	\rotOmega	ɑ	\vara		
ʄ	\fj	ɗ	\hookd	ɹ	\rotr	ɡ	\varg		

Table 16: t4phonet Phonetic Symbols

ð	\textcrd	ƈ	\texthtd	ǀ	\textpipe
ħ	\textcrh	ƙ	\texthtk	ɖ	\textrtaild
ɛ	\textepsilon	ƥ	\texthtp	ʈ	\textrtailt
ʃ	\textesh	ƭ	\texthtt	ɗ	\textschwa
ʩ	\textfjlig	ɩ	\textiota	ʃ	\textscriptv
ɓ	\texthtb	ɲ	\textltailn	ʧ	\textteshlig
ƈ	\texthtc	ɔ	\textopeno	ʒ	\textyogh

The idea behind the t4phonet package's phonetic symbols is to provide an interface to some of the characters in the T4 font encoding (Table 6 on page 8) but using the same names as the tipa characters presented in Table 10 on page 9.

Table 17: semtrans Transliteration Symbols

ʾ	\Alif	ʿ	\Ayn

Table 18: Text-mode Accents

Ää	\"{A}\"{a}	Àà	\‘{A}\‘{a}	Ạạ	\d{A}\d{a}	Åå	\r{A}\r{a}
Áá	\’{A}\’{a}	Ȧȧ	\\|{A}\\|{a}‡	Ä̆ä̆	\G{A}\G{a}‡	A͡a͡	\t{A}\t{a}
Ȧȧ	\.{A}\.{a}	Ãã	\~{A}\~{a}	Å̊å̊	\h{A}\h{a}§	Ăă	\u{A}\u{a}
Āā	\={A}\={a}	A̲a̲	\b{A}\b{a}	A̋a̋	\H{A}\H{a}	Ä̆ä̆	\U{A}\U{a}‡
Ââ	\^{A}\^{a}	Ą̇ą̇	\c{A}\c{a}	Ąą	\k{A}\k{a}†	Ǎǎ	\v{A}\v{a}

Â͡â \newtie{A}\newtie{a}* Ⓐⓐ \textcircled{A}\textcircled{a}

* Requires the textcomp package.

† Not available in the OT1 font encoding. Use the fontenc package to select an alternate font encoding, such as T1.

‡ Requires the T4 font encoding, provided by the fc package.

§ Requires the T5 font encoding, provided by the vntex package.

Also note the existence of \i and \j, which produce dotless versions of “i” and “j” (viz., “ı” and “ȷ”). These are useful when the accent is supposed to replace the dot. For example, “na\"{\i}ve” produces a correct “naïve”, while “na\"{i}ve” would yield the rather odd-looking “naïve”. (“na\"{i}ve” *does* work in encodings other than OT1, however.)

Table 19: tipa Text-mode Accents

Á́á́	\textacutemacron{A}\textacutemacron{a}
A̋a̋	\textacutewedge{A}\textacutewedge{a}

(continued on next page)

(continued from previous page)

Ạạ \textadvancing{A}\textadvancing{a}
Ạa \textbottomtiebar{A}\textbottomtiebar{a}
Ăă \textbrevemacron{A}\textbrevemacron{a}
Ãã \textcircumacute{A}\textcircumacute{a}
Ââ \textcircumdot{A}\textcircumdot{a}
Ǻǻ \textdotacute{A}\textdotacute{a}
Ẋẋ \textdotbreve{A}\textdotbreve{a}
Ẋẋ \textdotbreve{A}\textdotbreve{a}
Ȁȁ \textdoublegrave{A}\textdoublegrave{a}
Ȃȃ \textdoublevbaraccent{A}\textdoublevbaraccent{a}
Ȁȁ \textgravecircum{A}\textgravecircum{a}
Ȁȁ \textgravedot{A}\textgravedot{a}
Ȁȁ \textgravemacron{A}\textgravemacron{a}
Ȁȁ \textgravemid{A}\textgravemid{a}
Ạạ \textinvsubbridge{A}\textinvsubbridge{a}
Ạạ \textlowering{A}\textlowering{a}
Ǻǻ \textmidacute{A}\textmidacute{a}
Ǻǻ \textovercross{A}\textovercross{a}
Ăă \textoverw{A}\textoverw{a}
Ạạ \textpolhook{A}\textpolhook{a}
Ạạ \textraising{A}\textraising{a}
Ạạ \textretracting{A}\textretracting{a}
Ǻǻ \textringmacron{A}\textringmacron{a}
Ââ \textroundcap{A}\textroundcap{a}
Ạạ \textseagull{A}\textseagull{a}
Ạạ \textsubacute{A}\textsubacute{a}
Ạạ \textsubarch{A}\textsubarch{a}
Ạạ \textsubbar{A}\textsubbar{a}
Ạạ \textsubbridge{A}\textsubbridge{a}
Ạạ \textsubcircum{A}\textsubcircum{a}
Ạạ \textsubdot{A}\textsubdot{a}
Ạạ \textsubgrave{A}\textsubgrave{a}
Ạạ \textsublhalfring{A}\textsublhalfring{a}
Ạạ \textsubplus{A}\textsubplus{a}
Ạạ \textsubrhalfring{A}\textsubrhalfring{a}
Ạạ \textsubring{A}\textsubring{a}
Ạạ \textsubsquare{A}\textsubsquare{a}
Ạạ \textsubtilde{A}\textsubtilde{a}
Ạạ \textsubumlaut{A}\textsubumlaut{a}
Ạạ \textsubw{A}\textsubw{a}
Ạạ \textsubwedge{A}\textsubwedge{a}
~~Aa~~ \textsuperimposetilde{A}\textsuperimposetilde{a}

(continued on next page)

(continued from previous page)

A̡a̡	`\textsyllabic{A}\textsyllabic{a}`
Ã̰ã̰	`\texttildedot{A}\texttildedot{a}`
A͡a͡	`\texttoptiebar{A}\texttoptiebar{a}`
Ȧ̬ȧ̬	`\textvbaraccent{A}\textvbaraccent{a}`

tipa defines shortcut sequences for many of the above. See the tipa documentation for more information.

TABLE 20: extraipa Text-mode Accents

A̪a̪	`\bibridge{A}\bibridge{a}`
A̭a̭	`\crtilde{A}\crtilde{a}`
A̤a̤	`\dottedtilde{A}\dottedtilde{a}`
A̰a̰	`\doubletilde{A}\doubletilde{a}`
A̹a̹	`\finpartvoice{A}\finpartvoice{a}`
A̜a̜	`\finpartvoiceless{A}\finpartvoiceless{a}`
A̝a̝	`\inipartvoice{A}\inipartvoice{a}`
A̞a̞	`\inipartvoiceless{A}\inipartvoiceless{a}`
A̺a̺	`\overbridge{A}\overbridge{a}`
A̻a̻	`\partvoice{A}\partvoice{a}`
Ḁḁ	`\partvoiceless{A}\partvoiceless{a}`
A͍a͍	`\sliding{A}\sliding{a}`
A͎a͎	`\spreadlips{A}\spreadlips{a}`
A̺a̺	`\subcorner{A}\subcorner{a}`
A̼a̼	`\subdoublebar{A}\subdoublebar{a}`
A͇a͇	`\subdoublevert{A}\subdoublevert{a}`
A̹a̹	`\sublptr{A}\sublptr{a}`
A̺a̺	`\subrptr{A}\subrptr{a}`
A͈a͈	`\whistle{A}\whistle{a}`

TABLE 21: wsuipa Text-mode Accents

A̪a̪	`\dental{A}\dental{a}`
A̠a̠	`\underarch{A}\underarch{a}`

TABLE 22: phonetic Text-mode Accents

A̡a̡	`\hill{A}\hill{a}`	A̧a̧	`\rc{A}\rc{a}`	A̰a̰	`\ut{A}\ut{a}`
A̟a̟	`\od{A}\od{a}`	A̬a̬	`\syl{A}\syl{a}`		
Å̡å̡	`\ohill{A}\ohill{a}`	A̤a̤	`\td{A}\td{a}`		

The phonetic package provides a few additional macros for linguistic accents. `\acbar` and `\acarc` compose characters with multiple accents; for example, `\acbar{\'}{a}` produces "á̄" and `\acarc{\"}{e}` produces "ë̂". `\labvel` joins two characters with an arc: `\labvel{mn}` → "m͡n". `\upbar` is intended to go between characters as in "`x\upbar{}y''` → "x↑y". Lastly, `\uplett` behaves like `\textsuperscript` but uses a smaller font. Contrast "`p\uplett{h}''` → "pʰ" with "`p\textsuperscript{h}''` → "pʰ".

Table 23: metre Text-mode Accents

Áá	`\acutus{A}\acutus{a}`
Ăă	`\breve{A}\breve{a}`
Ãã	`\circumflexus{A}\circumflexus{a}`
Ää	`\diaeresis{A}\diaeresis{a}`
Àà	`\gravis{A}\gravis{a}`
Āā	`\macron{A}\macron{a}`

Table 24: t4phonet Text-mode Accents

Ȁȁ	`\textdoublegrave{A}\textdoublegrave{a}`
Ạạ	`\textvbaraccent{A}\textvbaraccent{a}`
Ḁḁ	`\textdoublevbaraccent{A}\textdoublevbaraccent{a}`

The idea behind the t4phonet package's text-mode accents is to provide an interface to some of the accents in the T4 font encoding (accents marked with "‡" in Table 18 on page 12) but using the same names as the tipa accents presented in Table 19 on page 12.

Table 25: arcs Text-mode Accents

A͡a	`\overarc{A}\overarc{a}`	A͜a	`\underarc{A}\underarc{a}`

The accents shown above scale only to a few characters wide. An optional macro argument alters the effective width of the accented characters. See the arcs documentation for more information.

Table 26: semtrans Accents

A̤a̤	`\D{A}\D{a}`	A̬a̬	`\U{A}\U{a}`

Ɐɐ	`\T{A}\T{a}`*

`\T` is not actually an accent but a command that rotates its argument 180° using the graphicx package's `\rotatebox` command.

Table 27: wsuipa Diacritics

ʿ	`\ain`	˂	`\leftp`	°	`\overring`	ˈ	`\stress`	ˬ	`\underwedge`
˥	`\corner`	˧	`\leftt`	̡	`\polishhook`	̩	`\syllabic`	ˆ	`\upp`
˅	`\downp`	ː	`\length`	˃	`\rightp`	̤	`\underdots`	˩	`\upt`
˦	`\downt`	~	`\midtilde`	˦	`\rightt`	̥	`\underring`		
ˈ	`\halflength`	̢	`\open`	ˌ	`\secstress`	̰	`\undertilde`		

The wsuipa package defines all of the above as ordinary characters, not as accents. However, it does provide `\diatop` and `\diaunder` commands, which are used to compose diacritics with other characters. For example, `\diatop[\overring|a]` produces "å", and `\diaunder[\underdots|a]` produces "a̤". See the wsuipa documentation for more information.

Table 28: textcomp Diacritics

˝	\textacutedbl	ˇ	\textasciicaron	¯	\textasciimacron
´	\textasciiacute	¨	\textasciidieresis	‟	\textgravedbl
˘	\textasciibreve	`	\textasciigrave		

The textcomp package defines all of the above as ordinary characters, not as accents.

Table 29: textcomp Currency Symbols

฿	\textbaht	$	\textdollar*	₲	\textguarani	₩	\textwon
¢	\textcent	$	\textdollaroldstyle	£	\textlira	¥	\textyen
¢	\textcentoldstyle	₫	\textdong	₦	\textnaira		
₡	\textcolonmonetary	€	\texteuro	₱	\textpeso		
¤	\textcurrency	f	\textflorin	£	\textsterling*		

* It's generally preferable to use the corresponding symbol from Table 3 on page 7 because the symbols in that table work properly in both text mode and math mode.

Table 30: marvosym Currency Symbols

ℛ	\Denarius	€	\EUR	€	\EURdig	€	\EURtm	℔	\Pfund
@	\Ecommerce	€	\EURcr	€	\EURhv	$	\EyesDollar	℘	\Shilling

The different euro signs are meant to be compatible with different fonts—Courier (\EURcr), Helvetica (\EURhv), Times (\EURtm), and the marvosym digits listed in Table 144 (\EURdig).

Table 31: wasysym Currency Symbols

¢	\cent	¤	\currency

Table 32: eurosym Euro Signs

€	\geneuro	€	\geneuronarrow	€	\geneurowide	€	\officialeuro

\euro is automatically mapped to one of the above—by default, \officialeuro—based on a eurosym package option. See the eurosym documentation for more information. The \geneuro... characters are generated from the current body font's "C" character and therefore may not appear exactly as shown.

Table 33: textcomp Legal Symbols

Ⓟ	\textcircledP	©	©	\textcopyright		℠	\textservicemark
ↄ	\textcopyleft	®	®	\textregistered	™	™	\texttrademark

Where two symbols are present, the left one is the "faked" symbol that LaTeX 2_ε provides by default, and the right one is the "true" symbol that textcomp makes available.

See `http://www.tex.ac.uk/cgi-bin/texfaq2html?label=tradesyms` for solutions to common problems that occur when using these symbols (e.g., getting a "ⓡ" when you expected to get a "®").

Table 34: cclicenses Creative Commons License Icons

🅭	\cc	🅯	\ccby	🅮	\ccnc*	🅰	\ccnd	🅱	\ccsa*

* These symbols utilize the rotating package and therefore display improperly in most DVI viewers.

Table 35: textcomp Old-style Numerals

0	\textzerooldstyle	4	\textfouroldstyle	8	\texteightoldstyle
1	\textoneoldstyle	5	\textfiveoldstyle	9	\textnineoldstyle
2	\texttwooldstyle	6	\textsixoldstyle		
3	\textthreeoldstyle	7	\textsevenoldstyle		

Rather than use the bulky `\textoneoldstyle`, `\texttwooldstyle`, etc. commands shown above, consider using `\oldstylenums{...}` to typeset an old-style number.

Table 36: Miscellaneous textcomp Symbols

⁎	`\textasteriskcentered`		a	a	`\textordfeminine`
‖	`\textbardbl`		o	o	`\textordmasculine`
◯	`\textbigcircle`			¶	`\textparagraph`*
ƀ	`\textblank`			·	`\textperiodcentered`
¦	`\textbrokenbar`			‱	`\textpertenthousand`
•	`\textbullet`			‰	`\textperthousand`
†	`\textdagger`*			¶	`\textpilcrow`
‡	`\textdaggerdbl`*			'	`\textquotesingle`
=	`\textdblhyphen`			'	`\textquotestraightbase`
=	`\textdblhyphenchar`			"	`\textquotestraightdblbase`
⁒	`\textdiscount`			℞	`\textrecipe`
℮	`\textestimated`			※	`\textreferencemark`
⁉	`\textinterrobang`			§	`\textsection`*
¡	`\textinterrobangdown`			—	`\textthreequartersemdash`
♪	`\textmusicalnote`			~	`\texttildelow`
№	`\textnumero`			—	`\texttwelveudash`
○	`\textopenbullet`				

Where two symbols are present, the left one is the "faked" symbol that LaTeX 2_ε provides by default, and the right one is the "true" symbol that textcomp makes available.

* It's generally preferable to use the corresponding symbol from Table 3 on page 7 because the symbols in that table work properly in both text mode and math mode.

Table 37: Miscellaneous wasysym Text-mode Symbols

‰	`\permil`

3 Mathematical symbols

Most, but not all, of the symbols in this section are math-mode only. That is, they yield a "`Missing $ inserted`" error message if not used within `$...$`, `\[...\]`, or another math-mode environment. Operators marked as "variable-sized" are taller in displayed formulas, shorter in in-text formulas, and possibly shorter still when used in various levels of superscripts or subscripts.

Alphanumeric symbols (e.g., "$\mathscr{L}$" and "$\mathbb{Z}$") are usually produced using one of the math alphabets in Table 151 rather than with an explicit symbol command. Look there first if you need a symbol for a transform, number set, or some other alphanumeric.

Although there have been many requests on `comp.text.tex` for a contradiction symbol, the ensuing discussion invariably reveals innumerable ways to represent contradiction in a proof, including "$\lightning$" (`\blitza`), "$\Rightarrow\Leftarrow$" (`\Rightarrow\Leftarrow`), "$\bot$" (`\bot`), "$\nleftrightarrow$" (`\nleftrightarrow`), and "$\textreferencemark$" (`\textreferencemark`). Because of the lack of notational consensus, it is probably better to spell out "Contradiction!" than to use a symbol for this purpose. Similarly, discussions on `comp.text.tex` have revealed that there are a variety of ways to indicate the mathematical notion of "is defined as". Common candidates include "$\triangleq$" (`\triangleq`), "$\equiv$" (`\equiv`), "$:=$" (`\coloneqq`), and "$\stackrel{\text{def}}{=}$" (`\stackrel{\text{def}}{=}`). See also the example of `\equalsfill` on page 70. Finally, the average value of a variable x is written by some people as "$\overline{x}$" (`\overline{x}`), by some people as "$\langle x \rangle$" (`\langle x \rangle`), and by some people as "$\varnothing x$" or "$\varnothing x$" (`\diameter x` or `\varnothing x`). The moral of the story is that you should be careful always to explain your notation to avoid confusing your readers.

Table 38: Math-Mode Versions of Text Symbols

$	`\mathdollar`	¶	`\mathparagraph`	£	`\mathsterling`
…	`\mathellipsis`	§	`\mathsection`	_	`\mathunderscore`

It's generally preferable to use the corresponding symbol from Table 3 on page 7 because the symbols in that table work properly in both text mode and math mode.

Table 39: Binary Operators

$\amalg$	`\amalg`	$\cup$	`\cup`	$\oplus$	`\oplus`	$\times$	`\times`
$*$	`\ast`	$\dagger$	`\dagger`	$\oslash$	`\oslash`	$\triangleleft$	`\triangleleft`
$\bigcirc$	`\bigcirc`	$\ddagger$	`\ddagger`	$\otimes$	`\otimes`	$\triangleright$	`\triangleright`
$\bigtriangledown$	`\bigtriangledown`	$\diamond$	`\diamond`	$\pm$	`\pm`	$\unlhd$	`\unlhd`*
$\bigtriangleup$	`\bigtriangleup`	$\div$	`\div`	$\rhd$	`\rhd`*	$\unrhd$	`\unrhd`*
$\bullet$	`\bullet`	$\lhd$	`\lhd`*	$\setminus$	`\setminus`	$\uplus$	`\uplus`
$\cap$	`\cap`	$\mp$	`\mp`	$\sqcap$	`\sqcap`	$\vee$	`\vee`
$\cdot$	`\cdot`	$\odot$	`\odot`	$\sqcup$	`\sqcup`	$\wedge$	`\wedge`
$\circ$	`\circ`	$\ominus$	`\ominus`	$\star$	`\star`	$\wr$	`\wr`

* Not predefined in LaTeX 2_ε. Use one of the packages latexsym, amsfonts, amssymb, txfonts, pxfonts, or wasysym.

Table 40: $\mathcal{AMS}$ Binary Operators

$\barwedge$	`\barwedge`	$\circledcirc$	`\circledcirc`	$\intercal$	`\intercal`
$\boxdot$	`\boxdot`	$\circleddash$	`\circleddash`	$\leftthreetimes$	`\leftthreetimes`
$\boxminus$	`\boxminus`	$\Cup$	`\Cup`	$\ltimes$	`\ltimes`
$\boxplus$	`\boxplus`	$\curlyvee$	`\curlyvee`	$\rightthreetimes$	`\rightthreetimes`
$\boxtimes$	`\boxtimes`	$\curlywedge$	`\curlywedge`	$\rtimes$	`\rtimes`
$\Cap$	`\Cap`	$\divideontimes$	`\divideontimes`	$\smallsetminus$	`\smallsetminus`
$\centerdot$	`\centerdot`	$\dotplus$	`\dotplus`	$\veebar$	`\veebar`
$\circledast$	`\circledast`	$\doublebarwedge$	`\doublebarwedge`		

TABLE 41: stmaryrd Binary Operators

⟠	\baro	⫼	\interleave	⊛	\varoast
⦸	\bbslash	⪡	\leftslice	⦶	\varobar
⅋	\binampersand	⩛	\merge	⦸	\varobslash
⋉	\bindnasrepma	⊖	\minuso	◎	\varocircle
⧆	\boxast	≗	\moo	⊙	\varodot
⧈	\boxbar	⨣	\nplus	⧁	\varogreaterthan
⧉	\boxbox	⦶	\obar	⧀	\varolessthan
⧅	\boxbslash	□	\oblong	⊖	\varominus
⧇	\boxcircle	⦸	\obslash	⊕	\varoplus
⊡	\boxdot	⧁	\ogreaterthan	⊘	\varoslash
□	\boxempty	⧀	\olessthan	⊗	\varotimes
⧄	\boxslash	⦷	\ovee	⦷	\varovee
⟇	\curlyveedownarrow	⦵	\owedge	⦵	\varowedge
⟈	\curlyveeuparrow	⪢	\rightslice	⨯	\vartimes
⟑	\curlywedgedownarrow	⫽	\sslash	⟙	\Ydown
⟇	\curlywedgeuparrow	⫿	\talloblong	≺	\Yleft
⧵	\fatbslash	◯	\varbigcirc	≻	\Yright
⨟	\fatsemi	⟇	\varcurlyvee	⟘	\Yup
⫽	\fatslash	⟑	\varcurlywedge		

TABLE 42: wasysym Binary Operators

◁	\lhd	○	\ocircle	►	\RHD	⊵	\unrhd
◄	\LHD	▷	\rhd	⊴	\unlhd		

TABLE 43: txfonts/pxfonts Binary Operators

⦶	\circledbar	⦵	\circledwedge	○	\medcirc
⦸	\circledbslash	⅋	\invamp	⨦	\sqcapplus
⦷	\circledvee	●	\medbullet	⨧	\sqcupplus

Table 44: mathabx Binary Operators

∗	\ast	⋏	\curlywedge	⊓	\sqcap
✻	\Asterisk	⨪	\divdot	⊔	\sqcup
⩛	\barwedge	⋇	\divideontimes	⩏	\sqdoublecap
★	\bigstar	∸	\dotdiv	⩐	\sqdoublecup
✶	\bigvarstar	∔	\dotplus	▫	\square
◆	\blackdiamond	⁜	\dottimes	⊞	\squplus
∩	\cap	⩘	\doublebarwedge	·	\udot
∔	\circplus	⋒	\doublecap	⊎	\uplus
⁎	\coasterisk	⋓	\doublecup	⋆	\varstar
✲	\coAsterisk	⋉	\ltimes	∨	\vee
✳	\convolution	⟴	\pluscirc	⩡	\veebar
∪	\cup	⋊	\rtimes	⩢	\veedoublebar
⋎	\curlyvee	▪	\sqbullet	∧	\wedge

Many of the above glyphs go by multiple names. \centerdot is equivalent to \sqbullet, and \ast is equivalent to *. \asterisk produces the same glyph as \ast, but as an ordinary symbol, not a binary operator. Similarly, \bigast produces a large-operator version of the \Asterisk binary operator, and \bigcoast produces a large-operator version of the \coAsterisk binary operator.

Table 45: ulsy Geometric Binary Operators

⦶	\odplus

Table 46: mathabx Geometric Binary Operators

▾	\blacktriangledown	⊞	\boxright	⊖	\ominus
◂	\blacktriangleleft	⧄	\boxslash	⊕	\oplus
▸	\blacktriangleright	⊠	\boxtimes	⊕	\oright
▴	\blacktriangleup	⊟	\boxtop	⊘	\oslash
⊛	\boxasterisk	⧋	\boxtriangleup	⊗	\otimes
⧅	\boxbackslash	□	\boxvoid	⊗	\otop
⊟	\boxbot	⊛	\oasterisk	⧋	\otriangleup
⊡	\boxcirc	⦸	\obackslash	○	\ovoid
⊛	\boxcoasterisk	⦶	\obot	▿	\smalltriangledown
⊞	\boxdiv	⊙	\ocirc	◃	\smalltriangleleft
⊡	\boxdot	⊛	\ocoasterisk	▹	\smalltriangleright
⊞	\boxleft	⨸	\odiv	▵	\smalltriangleup
⊟	\boxminus	⊙	\odot		
⊞	\boxplus	⊕	\oleft		

Table 47: Variable-sized Math Operators

$\bigcap$	\bigcap	$\bigotimes$	\bigotimes	$\bigwedge$	\bigwedge	$\prod$	\prod
$\bigcup$	\bigcup	$\bigsqcup$	\bigsqcup	$\coprod$	\coprod	$\sum$	\sum
$\bigodot$	\bigodot	$\biguplus$	\biguplus	$\int$	\int		
$\bigoplus$	\bigoplus	$\bigvee$	\bigvee	$\oint$	\oint		

TABLE 48: $\mathcal{AMS}$ Variable-sized Math Operators

$\iint$	$\iint$	`\iint`	$\iiint$	$\iiint$	`\iiint`
$\iiiint$	$\iiiint$	`\iiiint`	$\int\cdots\int$	$\int\cdots\int$	`\idotsint`

TABLE 49: stmaryrd Variable-sized Math Operators

$\bigboxbox$	`\bigbox`	$\biginterleave$	`\biginterleave`	$\bigsqcap$	`\bigsqcap`
$\bigcurlyvee$	`\bigcurlyvee`	$\bigoplus$	`\bignplus`	$\bigtriangledown$	`\bigtriangledown`
$\bigcurlywedge$	`\bigcurlywedge`	$\bigparallel$	`\bigparallel`	$\bigtriangleup$	`\bigtriangleup`

TABLE 50: wasysym Variable-sized Math Operators

$\int$	`\int`[†]	$\iint$	`\iint`	$\iiint$	`\iiint`
$\int$	`\varint`[*]	$\oint$	`\varoint`[*]	$\oiint$	`\oiint`

None of the preceding symbols are defined when wasysym is passed the nointegrals option.

[*] Not defined when wasysym is passed the integrals option.

[†] Defined only when wasysym is passed the integrals option. Otherwise, the default LaTeX `\int` glyph (as shown in Table 47) is used.

TABLE 51: mathabx Variable-sized Math Operators

	\bigcurlyvee	
	\bigsqcap	
	\bigcurlywedge	
	\bigboxasterisk	
	\bigboxbackslash	
	\bigboxbot	
	\bigboxcirc	
	\bigboxcoasterisk	
	\bigboxdiv	
	\bigboxdot	
	\bigboxleft	
	\bigboxminus	
	\bigboxplus	
	\bigboxright	
	\bigboxslash	
	\bigboxtimes	
	\bigboxtop	
	\bigboxtriangleup	
	\bigboxvoid	
	\bigcomplementop	
	\bigoasterisk	
	\bigobackslash	
	\bigobot	
	\bigocirc	
	\bigocoasterisk	
	\bigodiv	
	\bigoleft	
	\bigominus	
	\bigoright	
	\bigoslash	
	\bigotop	
	\bigotriangleup	
	\bigovoid	
	\bigplus	
	\bigsquplus	
	\bigtimes	
	\iiint	
	\iint	
	\int	
	\oiint	
	\oint	

TABLE 52: txfonts/pxfonts Variable-sized Math Operators

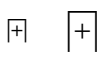
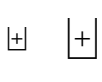
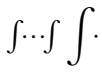
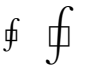
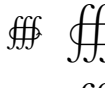
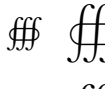
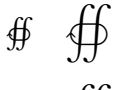
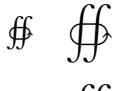
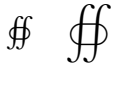
$\bigsqcapplus$		\bigsqcapplus	$\ointclockwise$		\ointclockwise
$\bigsqcupplus$		\bigsqcupplus	$\ointctrclockwise$		\ointctrclockwise
$\fint$		\fint	$\sqiiint$		\sqiiint
$\idotsint$		\idotsint	$\sqiint$		\sqiint
$\iiiint$		\iiiint	$\sqint$		\sqint
$\iiint$		\iiint	$\varoiiintclockwise$		\varoiiintclockwise
$\iint$		\iint	$\varoiiintctrclockwise$		\varoiiintctrclockwise
$\oiiintclockwise$		\oiiintclockwise	$\varoiintclockwise$		\varoiintclockwise
$\oiiintctrclockwise$		\oiiintctrclockwise	$\varoiintctrclockwise$		\varoiintctrclockwise
$\oiiint$		\oiiint	$\varointclockwise$		\varointclockwise
$\oiintclockwise$		\oiintclockwise	$\varointctrclockwise$		\varointctrclockwise
$\oiintctrclockwise$		\oiintctrclockwise	$\varprod$		\varprod
$\oiint$		\oiint			

TABLE 53: esint Variable-sized Math Operators

$\int\cdots\int$	$\dotsint$		$\oint\!\!\!\!\bigcirc$	$\ointclockwise$	
$\fint$	$\fint$		$\oint\!\!\!\!\circlearrowleft$	$\ointctrclockwise$	
$\iiiint$	$\iiiint$		$\sqint\!\!\!\sqint$	$\sqiint$	
$\iiint$	$\iiint$		$\sqint$	$\sqint$	
$\iint$	$\iint$		$\oint\!\!\!\oint$	$\varoiint$	
$\landdownint$	$\landdownint$		$\oint\!\!\!\!\circlearrowleft$	$\varointclockwise$	
$\landupint$	$\landupint$		$\oint\!\!\!\!\circlearrowleft$	$\varointctrclockwise$	
$\oiint$	$\oiint$				

TABLE 54: Binary Relations

$\approx$	\approx	$\equiv$	\equiv	$\perp$	\perp	$\smile$	\smile
$\asymp$	\asymp	$\frown$	\frown	$\prec$	\prec	$\succ$	\succ
$\bowtie$	\bowtie	$\bowtie$	\Join*	$\preceq$	\preceq	$\succeq$	\succeq
$\cong$	\cong	$\mid$	\mid	$\propto$	\propto	$\vdash$	\vdash
$\dashv$	\dashv	$\models$	\models	$\sim$	\sim		
$\doteq$	\doteq	$\parallel$	\parallel	$\simeq$	\simeq		

* Not predefined in LaTeX 2_ε. Use one of the packages latexsym, amsfonts, amssymb, mathabx, txfonts, pxfonts, or wasysym.

TABLE 55: $\mathcal{AMS}$ Binary Relations

$\approxeq$	\approxeq	$\eqcirc$	\eqcirc	$\succapprox$	\succapprox
$\backepsilon$	\backepsilon	$\fallingdotseq$	\fallingdotseq	$\succcurlyeq$	\succcurlyeq
$\backsim$	\backsim	$\multimap$	\multimap	$\succsim$	\succsim
$\backsimeq$	\backsimeq	$\pitchfork$	\pitchfork	$\therefore$	\therefore
$\because$	\because	$\precapprox$	\precapprox	$\thickapprox$	\thickapprox
$\between$	\between	$\preccurlyeq$	\preccurlyeq	$\thicksim$	\thicksim
$\Bumpeq$	\Bumpeq	$\precsim$	\precsim	$\varpropto$	\varpropto
$\bumpeq$	\bumpeq	$\risingdotseq$	\risingdotseq	$\Vdash$	\Vdash
$\circeq$	\circeq	$\shortmid$	\shortmid	$\vDash$	\vDash
$\curlyeqprec$	\curlyeqprec	$\shortparallel$	\shortparallel	$\Vvdash$	\Vvdash
$\curlyeqsucc$	\curlyeqsucc	$\smallfrown$	\smallfrown		
$\doteqdot$	\doteqdot	$\smallsmile$	\smallsmile		

Table 56: $\mathcal{AMS}$ Negated Binary Relations

$\ncong$	`\ncong`	$\nshortparallel$	`\nshortparallel`	$\nVDash$	`\nVDash`
$\nmid$	`\nmid`	$\nsim$	`\nsim`	$\precnapprox$	`\precnapprox`
$\nparallel$	`\nparallel`	$\nsucc$	`\nsucc`	$\precnsim$	`\precnsim`
$\nprec$	`\nprec`	$\nsucceq$	`\nsucceq`	$\succnapprox$	`\succnapprox`
$\npreceq$	`\npreceq`	$\nvDash$	`\nvDash`	$\succnsim$	`\succnsim`
$\nshortmid$	`\nshortmid`	$\nvdash$	`\nvdash`		

Table 57: stmaryrd Binary Relations

$\inplus$	`\inplus`	$\niplus$	`\niplus`

Table 58: wasysym Binary Relations

$\invneg$	`\invneg`	$\leadsto$	`\leadsto`	$\wasypropto$	`\wasypropto`
$\Join$	`\Join`	$\logof$	`\logof`		

Table 59: txfonts/pxfonts Binary Relations

$\circledgtr$	`\circledgtr`	$\lJoin$	`\lJoin`	$\opentimes$	`\opentimes`
$\circledless$	`\circledless`	$\lrtimes$	`\lrtimes`	$\Perp$	`\Perp`
$:\approx$	`\colonapprox`	$\multimap$	`\multimap`	$\preceqq$	`\preceqq`
$::\approx$	`\Colonapprox`	$\multimapboth$	`\multimapboth`	$\precneqq$	`\precneqq`
$:-$	`\coloneq`	$\multimapbothvert$	`\multimapbothvert`	$\rJoin$	`\rJoin`
$::-$	`\Coloneq`	$\multimapdot$	`\multimapdot`	$\strictfi$	`\strictfi`
$::=$	`\Coloneqq`	$\multimapdotboth$	`\multimapdotboth`	$\strictif$	`\strictif`
$:=$	`\coloneqq`*	$\multimapdotbothA$	`\multimapdotbothA`	$\strictiff$	`\strictiff`
$::\sim$	`\Colonsim`	$\multimapdotbothAvert$	`\multimapdotbothAvert`	$\succeqq$	`\succeqq`
$:\sim$	`\colonsim`	$\multimapdotbothB$	`\multimapdotbothB`	$\succneqq$	`\succneqq`
$-::$	`\Eqcolon`	$\multimapdotbothBvert$	`\multimapdotbothBvert`	$\varparallel$	`\varparallel`
$-:$	`\eqcolon`	$\multimapdotbothvert$	`\multimapdotbothvert`	$\varparallelinv$	`\varparallelinv`
$=:$	`\eqqcolon`	$\multimapdotinv$	`\multimapdotinv`	$\VvDash$	`\VvDash`
$=::$	`\Eqqcolon`	$\multimapinv$	`\multimapinv`		
$\eqsim$	`\eqsim`	$\openJoin$	`\openJoin`		

* As an alternative to using txfonts/pxfonts, a ":=" symbol can be constructed with "`\mathrel{\mathop:}=`".

Table 60: txfonts/pxfonts Negated Binary Relations

$\napproxeq$	`\napproxeq`	$\npreccurlyeq$	`\npreccurlyeq`	$\nthickapprox$	`\nthickapprox`
$\nasymp$	`\nasymp`	$\npreceqq$	`\npreceqq`	$\ntwoheadleftarrow$	`\ntwoheadleftarrow`
$\nbacksim$	`\nbacksim`	$\nprecsim$	`\nprecsim`	$\ntwoheadrightarrow$	`\ntwoheadrightarrow`
$\nbacksimeq$	`\nbacksimeq`	$\nsimeq$	`\nsimeq`	$\nvarparallel$	`\nvarparallel`
$\nbumpeq$	`\nbumpeq`	$\nsuccapprox$	`\nsuccapprox`	$\nvarparallelinv$	`\nvarparallelinv`
$\nBumpeq$	`\nBumpeq`	$\nsucccurlyeq$	`\nsucccurlyeq`	$\nVdash$	`\nVdash`
$\nequiv$	`\nequiv`	$\nsucceqq$	`\nsucceqq`		
$\nprecapprox$	`\nprecapprox`	$\nsuccsim$	`\nsuccsim`		

TABLE 61: mathabx Binary Relations

≬	\between	∣	\divides	≓	\risingdotseq
≒	\botdoteq	≒	\dotseq	≿	\succapprox
≎	\Bumpedeq	≖	\eqbumped	⩾	\succcurlyeq
≏	\bumpedeq	≗	\eqcirc	≻	\succdot
≗	\circeq	≕	\eqcolon	≿	\succsim
≔	\coloneq	≒	\fallingdotseq	∴	\therefore
≙	\corresponds	⩾	\ggcurly	≐	\topdoteq
⋞	\curlyeqprec	⋘	\llcurly	⊨	\vDash
⋟	\curlyeqsucc	≾	\precapprox	⊩	\Vdash
⫤	\DashV	⋞	\preccurlyeq	⊫	\VDash
⫣	\Dashv	≺	\precdot	⊪	\Vvdash
⫦	\dashVv	≾	\precsim		

TABLE 62: mathabx Negated Binary Relations

≉	\napprox	⋬	\notperp	⊭	\nvDash
≇	\ncong	⊀	\nprec	⊯	\nVDash
⋠	\ncurlyeqprec	⋨	\nprecapprox	⊮	\nVdash
⋡	\ncurlyeqsucc	⋠	\npreccurlyeq	⊬	\nvdash
⊯	\nDashv	⋪	\npreceq	⊮	\nVvash
⊮	\ndashV	⋨	\nprecsim	⋨	\precnapprox
⊬	\ndashv	⊁	\nsim	⪵	\precneq
⊯	\nDashV	≄	\nsimeq	⋨	\precnsim
⊮	\ndashVv	⊁	\nsucc	⋩	\succnapprox
≠	\neq	⋩	\nsuccapprox	⪶	\succneq
≭	\notasymp	⋡	\nsucccurlyeq	⋩	\succnsim
∤	\notdivides	⋡	\nsucceq		
≢	\notequiv	⋩	\nsuccsim		

The \changenotsign command toggles the behavior of \not to produce either a vertical or a diagonal slash through a binary operator. Thus, "$a \not= b$" can be made to produce either "$a \not= b$" or "$a \neq b$".

TABLE 63: trsym Binary Relations

⊷	\InversTransformHoriz	⊶	\TransformHoriz
⥮	\InversTransformVert	⥯	\TransformVert

TABLE 64: trfsigns Binary Relations

⟃	\dfourier	⟄	\Dfourier
⟃	\fourier	⟄	\Fourier
⟃	\laplace	⟄	\Laplace
⟃	\ztransf	⟄	\Ztransf

TABLE 65: Subset and Superset Relations

$\sqsubset$	\sqsubset*	$\sqsupseteq$	\sqsupseteq	$\supset$	\supset
$\sqsubseteq$	\sqsubseteq	$\subset$	\subset	$\supseteq$	\supseteq
$\sqsupset$	\sqsupset*	$\subseteq$	\subseteq		

* Not predefined in LaTeX 2_ε. Use one of the packages latexsym, amsfonts, amssymb, mathabx, txfonts, pxfonts, or wasysym.

TABLE 66: $\mathcal{AMS}$ Subset and Superset Relations

$\nsubseteq$	\nsubseteq	$\subseteqq$	\subseteqq	$\supsetneqq$	\supsetneqq
$\nsupseteq$	\nsupseteq	$\subsetneq$	\subsetneq	$\varsubsetneq$	\varsubsetneq
$\nsupseteqq$	\nsupseteqq	$\subsetneqq$	\subsetneqq	$\varsubsetneqq$	\varsubsetneqq
$\sqsubset$	\sqsubset	$\Supset$	\Supset	$\varsupsetneq$	\varsupsetneq
$\sqsupset$	\sqsupset	$\supseteqq$	\supseteqq	$\varsupsetneqq$	\varsupsetneqq
$\Subset$	\Subset	$\supsetneq$	\supsetneq		

TABLE 67: stmaryrd Subset and Superset Relations

$\subsetplus$	\subsetplus	$\supsetplus$	\supsetplus
$\subsetpluseq$	\subsetpluseq	$\supsetpluseq$	\supsetpluseq

TABLE 68: wasysym Subset and Superset Relations

$\sqsubset$	\sqsubset	$\sqsupset$	\sqsupset

TABLE 69: txfonts/pxfonts Subset and Superset Relations

$\nsqsubset$	\nsqsubset	$\nsqsupseteq$	\nsqsupseteq	$\nSupset$	\nSupset
$\nsqsubseteq$	\nsqsubseteq	$\nSubset$	\nSubset		
$\nsqsupset$	\nsqsupset	$\nsubseteqq$	\nsubseteqq		

TABLE 70: mathabx Subset and Superset Relations

$\nsqsubset$	\nsqsubset	$\nsupset$	\nsupset	$\sqsupseteq$	\sqsupseteq	$\supseteq$	\supseteq
$\nsqSubset$	\nsqSubset	$\nSupset$	\nSupset	$\sqsupseteqq$	\sqsupseteqq	$\supseteqq$	\supseteqq
$\nsqsubseteq$	\nsqsubseteq	$\nsupseteq$	\nsupseteq	$\sqsupsetneq$	\sqsupsetneq	$\supsetneq$	\supsetneq
$\nsqsubseteqq$	\nsqsubseteqq	$\nsupseteqq$	\nsupseteqq	$\sqsupsetneqq$	\sqsupsetneqq	$\supsetneqq$	\supsetneqq
$\nsqsupset$	\nsqsupset	$\sqsubset$	\sqsubset	$\subset$	\subset	$\varsqsubsetneq$	\varsqsubsetneq
$\nsqSupset$	\nsqSupset	$\sqSubset$	\sqSubset	$\Subset$	\Subset	$\varsqsubsetneqq$	\varsqsubsetneqq
$\nsqsupseteq$	\nsqsupseteq	$\sqsubseteq$	\sqsubseteq	$\subseteq$	\subseteq	$\varsqsupsetneq$	\varsqsupsetneq
$\nsqsupseteqq$	\nsqsupseteqq	$\sqsubseteqq$	\sqsubseteqq	$\subseteqq$	\subseteqq	$\varsqsupsetneqq$	\varsqsupsetneqq
$\nsubset$	\nsubset	$\sqsubsetneq$	\sqsubsetneq	$\subsetneq$	\subsetneq	$\varsubsetneq$	\varsubsetneq
$\nSubset$	\nSubset	$\sqsubsetneqq$	\sqsubsetneqq	$\subsetneqq$	\subsetneqq	$\varsubsetneqq$	\varsubsetneqq
$\nsubseteq$	\nsubseteq	$\sqSupset$	\sqSupset	$\supset$	\supset	$\varsupsetneq$	\varsupsetneq
$\nsubseteqq$	\nsubseteqq	$\sqsupset$	\sqsupset	$\Supset$	\Supset	$\varsupsetneqq$	\varsupsetneqq

TABLE 71: Inequalities

$\geq$	`\geq`	$\gg$	`\gg`	$\leq$	`\leq`	$\ll$	`\ll`	$\neq$	`\neq`

TABLE 72: $\mathcal{AMS}$ Inequalities

$\geqslant$	`\eqslantgtr`	$\gtrdot$	`\gtrdot`	$\lesseqgtr$	`\lesseqgtr`	$\ngeq$	`\ngeq`
$\leqslant$	`\eqslantless`	$\gtreqless$	`\gtreqless`	$\lesseqqgtr$	`\lesseqqgtr`	$\ngeqq$	`\ngeqq`
$\geqq$	`\geqq`	$\gtreqqless$	`\gtreqqless`	$\lessgtr$	`\lessgtr`	$\ngeqslant$	`\ngeqslant`
$\geqslant$	`\geqslant`	$\gtrless$	`\gtrless`	$\lesssim$	`\lesssim`	$\ngtr$	`\ngtr`
$\ggg$	`\ggg`	$\gtrsim$	`\gtrsim`	$\lll$	`\lll`	$\nleq$	`\nleq`
$\gnapprox$	`\gnapprox`	$\gvertneqq$	`\gvertneqq`	$\lnapprox$	`\lnapprox`	$\nleqq$	`\nleqq`
$\gneq$	`\gneq`	$\leqq$	`\leqq`	$\lneq$	`\lneq`	$\nleqslant$	`\nleqslant`
$\gneqq$	`\gneqq`	$\leqslant$	`\leqslant`	$\lneqq$	`\lneqq`	$\nless$	`\nless`
$\gnsim$	`\gnsim`	$\lessapprox$	`\lessapprox`	$\lnsim$	`\lnsim`		
$\gtrapprox$	`\gtrapprox`	$\lessdot$	`\lessdot`	$\lvertneqq$	`\lvertneqq`		

TABLE 73: wasysym Inequalities

$\gtrsim$	`\apprge`	$\lesssim$	`\apprle`

TABLE 74: txfonts/pxfonts Inequalities

$\ngg$	`\ngg`	$\ngtrsim$	`\ngtrsim`	$\nlesssim$	`\nlesssim`
$\ngtrapprox$	`\ngtrapprox`	$\nlessapprox$	`\nlessapprox`	$\nll$	`\nll`
$\ngtrless$	`\ngtrless`	$\nlessgtr$	`\nlessgtr`		

TABLE 75: mathabx Inequalities

⩾	\eqslantgtr	≧	\gtreqless	≲	\lesssim	≯	\ngtr
⩽	\eqslantless	≧	\gtreqqless	≪	\ll	≯	\ngtrapprox
⩾	\geq	≧	\gtrless	⋘	\lll	≯	\ngtrsim
≧	\geqq	≳	\gtrsim	⪉	\lnapprox	≰	\nleq
≫	\gg	≩	\gvertneqq	≤	\lneq	≰	\nleqq
⋙	\ggg	⩽	\leq	≨	\lneqq	≮	\nless
⪊	\gnapprox	≦	\leqq	≲	\lnsim	≮	\nlessapprox
≥	\gneq	≲	\lessapprox	≰	\lvertneqq	≮	\nlesssim
≩	\gneqq	⋖	\lessdot	⋭	\neqslantgtr	≱	\nvargeq
⋧	\gnsim	≶	\lesseqgtr	⋦	\neqslantless	≰	\nvarleq
⪆	\gtrapprox	≶	\lesseqqgtr	⩾	\ngeq	≥	\vargeq
⋗	\gtrdot	≶	\lessgtr	≱	\ngeqq	≤	\varleq

mathabx defines \leqslant and \le as synonyms for \leq, \geqslant and \ge as synonyms for \geq, \nleqslant as a synonym for \nleq, and \ngeqslant as a synonym for \ngeq.

TABLE 76: $\mathcal{AMS}$ Triangle Relations

◀	\blacktriangleleft	⋬	\ntrianglelefteq	⊴	\trianglelefteq	◁	\vartriangleleft
▶	\blacktriangleright	⋭	\ntriangleright	≜	\triangleq	▷	\vartriangleright
⋪	\ntriangleleft	⋭	\ntrianglerighteq	⊵	\trianglerighteq		

TABLE 77: stmaryrd Triangle Relations

⧏	\trianglelefteqslant	⧐	\trianglerighteqslant
⧏̸	\ntrianglelefteqslant	⧐̸	\ntrianglerighteqslant

TABLE 78: mathabx Triangle Relations

⋪	\ntriangleleft	⋭	\ntrianglerighteq	⊳	\triangleright	▷	\vartriangleright
⋬	\ntrianglelefteq	⊲	\triangleleft	⊵	\trianglerighteq		
⋫	\ntriangleright	⊴	\trianglelefteq	◁	\vartriangleleft		

TABLE 79: Arrows

⇓	\Downarrow	⟵	\longleftarrow	↖	\nwarrow
↓	\downarrow	⟸	\Longleftarrow	⇒	\Rightarrow
↩	\hookleftarrow	⟷	\longleftrightarrow	→	\rightarrow
↪	\hookrightarrow	⟺	\Longleftrightarrow	↘	\searrow
⇝	\leadsto*	⟼	\longmapsto	↙	\swarrow
←	\leftarrow	⟹	\Longrightarrow	↑	\uparrow
⇐	\Leftarrow	⟶	\longrightarrow	⇑	\Uparrow
⇔	\Leftrightarrow	↦	\mapsto	↕	\updownarrow
↔	\leftrightarrow	↗	\nearrow†	⇕	\Updownarrow

* Not predefined in LaTeX 2_ε. Use one of the packages latexsym, amsfonts, amssymb, txfonts, pxfonts, or wasysym.

† See the note beneath Table 126 for information about how to put a diagonal arrow across a mathematical expression (as in "$\not\nearrow \vec{B}^{\,0}$") .

TABLE 80: Harpoons

↽	\leftharpoondown	⇁	\rightharpoondown	⇌	\rightleftharpoons
↼	\leftharpoonup	⇀	\rightharpoonup		

TABLE 81: textcomp Text-mode Arrows

↓	\textdownarrow	→	\textrightarrow
←	\textleftarrow	↑	\textuparrow

TABLE 82: $\mathcal{AMS}$ Arrows

↺	\circlearrowleft	⇇	\leftleftarrows	⇄	\rightleftarrows
↻	\circlearrowright	⇆	\leftrightarrows	⇉	\rightrightarrows
↶	\curvearrowleft	↭	\leftrightsquigarrow	⇝	\rightsquigarrow
↷	\curvearrowright	⇚	\Lleftarrow	↱	\Rsh
⇠	\dashleftarrow	↫	\looparrowleft	↞	\twoheadleftarrow
⇢	\dashrightarrow	↬	\looparrowright	↠	\twoheadrightarrow
⇊	\downdownarrows	↰	\Lsh	⇈	\upuparrows
↢	\leftarrowtail	↣	\rightarrowtail		

TABLE 83: $\mathcal{AMS}$ Negated Arrows

⇍	\nLeftarrow	⇎	\nLeftrightarrow	⇏	\nRightarrow
↚	\nleftarrow	↮	\nleftrightarrow	↛	\nrightarrow

TABLE 84: $\mathcal{AMS}$ Harpoons

⇂	\downharpoonleft	⇋	\leftrightharpoons	↿	\upharpoonleft
⇃	\downharpoonright	⇌	\rightleftharpoons	↾	\upharpoonright

Table 85: stmaryrd Arrows

⇽	\leftarrowtriangle	⤆	\Mapsfrom	←	\shortleftarrow
⥱	\leftrightarroweq	↤	\mapsfrom	→	\shortrightarrow
⇿	\leftrightarrowtriangle	⤇	\Mapsto	↑	\shortuparrow
↯	\lightning	↗	\nnearrow	↘	\ssearrow
⟽	\Longmapsfrom	↖	\nnwarrow	↙	\sswarrow
⟻	\longmapsfrom	⇾	\rightarrowtriangle		
⟾	\Longmapsto	↓	\shortdownarrow		

Table 86: txfonts/pxfonts Arrows

⇐⊡	\boxdotLeft	⊙→	\circleddotright	←◇	\Diamondleft
←⊡	\boxdotleft	←○	\circleleft	◇→	\Diamondright
⊡→	\boxdotright	○→	\circleright	◇⇒	\DiamondRight
⊡⇒	\boxdotRight	⇠	\dashleftrightarrow	⇜	\leftsquigarrow
⇐□	\boxLeft	⇐◈	\DiamonddotLeft	⇗	\Nearrow
←□	\boxleft	←◈	\Diamonddotleft	⇖	\Nwarrow
□→	\boxright	◈→	\Diamonddotright	⇛	\Rrightarrow
□⇒	\boxRight	◈⇒	\DiamonddotRight	⇘	\Searrow
←⊙	\circleddotleft	⇐◇	\DiamondLeft	⇙	\Swarrow

Table 87: mathabx Arrows

↺	\circlearrowleft	←	\leftarrow	↖	\nwarrow
↻	\circlearrowright	⇇	\leftleftarrows	↾	\restriction
↶	\curvearrowbotleft	↔	\leftrightarrow	→	\rightarrow
↭	\curvearrowbotleftright	⇆	\leftrightarrows	⇄	\rightleftarrows
↷	\curvearrowbotright	↭	\leftrightsquigarrow	⇉	\rightrightarrows
↶	\curvearrowleft	↜	\leftsquigarrow	⇝	\rightsquigarrow
↭	\curvearrowleftright	⟳	\lefttorightarrow	↩	\righttoleftarrow
↷	\curvearrowright	↫	\looparrowdownleft	↱	\Rsh
↲	\dlsh	↬	\looparrowdownright	↘	\searrow
⇊	\downdownarrows	↫	\looparrowleft	↙	\swarrow
↺	\downtouparrow	↬	\looparrowright	↑↓	\updownarrows
↓↑	\downuparrows	↰	\Lsh	∩	\uptodownarrow
↳	\drsh	↗	\nearrow	↑↑	\upuparrows

Table 88: mathabx Negated Arrows

⇍	\nLeftarrow	↮	\nleftrightarrow	↛	\nrightarrow
↚	\nleftarrow	⇎	\nLeftrightarrow	⇏	\nRightarrow

Table 89: mathabx Harpoons

⥍	\barleftharpoon	↼	\leftharpoonup	⥋	\rightleftharpoons
⥎	\barrightharpoon	⇚	\leftleftharpoons	⇛	\rightrightharpoons
⥥	\downdownharpoons	↽	\leftrightharpoon	⥮	\updownharpoons
⥖	\downharpoonleft	⇋	\leftrightharpoons	↿	\upharpoonleft
⥗	\downharpoonright	⥤	\rightbarharpoon	↾	\upharpoonright
⥯	\downupharpoons	⇁	\rightharpoondown	⥣	\upupharpoons
⥌	\leftbarharpoon	⇀	\rightharpoonup		
↽	\leftharpoondown	⇄	\rightleftharpoon		

Table 90: chemarrow Arrows

→	\chemarrow

Table 91: ulsy Contradiction Symbols

↯	\blitza	↯	\blitzb	↯	\blitzc	↯	\blitzd	↯	\blitze

Table 92: Extension Characters

–	\relbar	=	\Relbar

Table 93: stmaryrd Extension Characters

⫽	\Arrownot	⤇	\Mapsfromchar	⤆	\Mapstochar
⫻	\arrownot	⤅	\mapsfromchar		

Table 94: txfonts/pxfonts Extension Characters

⤄	\Mappedfromchar	⤋	\Mmappedfromchar	⤊	\Mmapstochar
⤃	\mappedfromchar	⤉	\mmappedfromchar	⤈	\mmapstochar

Table 95: mathabx Extension Characters

⤅	\mapsfromchar	⤆	\mapstochar
⤇	\Mapsfromchar	⤇	\Mapstochar

Table 96: Log-like Symbols

`\arccos`	`\cos`	`\csc`	`\exp`	`\ker`	`\limsup`	`\min`	`\sinh`
`\arcsin`	`\cosh`	`\deg`	`\gcd`	`\lg`	`\ln`	`\Pr`	`\sup`
`\arctan`	`\cot`	`\det`	`\hom`	`\lim`	`\log`	`\sec`	`\tan`
`\arg`	`\coth`	`\dim`	`\inf`	`\liminf`	`\max`	`\sin`	`\tanh`

Calling the above "symbols" may be a bit misleading.[1] Each log-like symbol merely produces the eponymous textual equivalent, but with proper surrounding spacing. See Section 7.3 for more information about log-like symbols. As `\bmod` and `\pmod` are arguably not symbols we refer the reader to the Short Math Guide for LaTeX [Dow00] for samples.

Table 97: $\mathcal{AMS}$ Log-like Symbols

inj lim	`\injlim`	$\varinjlim$	`\varinjlim`	$\varlimsup$	`\varlimsup`
proj lim	`\projlim`	$\varliminf$	`\varliminf`	$\varprojlim$	`\varprojlim`

Load the amsmath package to get these symbols. See Section 7.3 for some additional comments regarding log-like symbols. As `\mod` and `\pod` are arguably not symbols we refer the reader to the Short Math Guide for LaTeX [Dow00] for samples.

Table 98: Greek Letters

α	`\alpha`	θ	`\theta`	o	`o`	τ	`\tau`
β	`\beta`	ϑ	`\vartheta`	π	`\pi`	υ	`\upsilon`
γ	`\gamma`	ι	`\iota`	ϖ	`\varpi`	ϕ	`\phi`
δ	`\delta`	κ	`\kappa`	ρ	`\rho`	φ	`\varphi`
ϵ	`\epsilon`	λ	`\lambda`	ϱ	`\varrho`	χ	`\chi`
ε	`\varepsilon`	μ	`\mu`	σ	`\sigma`	ψ	`\psi`
ζ	`\zeta`	ν	`\nu`	ς	`\varsigma`	ω	`\omega`
η	`\eta`	ξ	`\xi`				
Γ	`\Gamma`	Λ	`\Lambda`	Σ	`\Sigma`	Ψ	`\Psi`
Δ	`\Delta`	Ξ	`\Xi`	Υ	`\Upsilon`	Ω	`\Omega`
Θ	`\Theta`	Π	`\Pi`	Φ	`\Phi`		

The remaining Greek majuscules can be produced with ordinary Latin letters. The symbol "M", for instance, is used for both an uppercase "m" and an uppercase "μ". See Section 7.4 for examples of how to produce bold Greek letters.

Table 99: $\mathcal{AMS}$ Greek Letters

$\digamma$	`\digamma`	$\varkappa$	`\varkappa`

[1] Michael J. Downes prefers the more general term, "atomic math objects".

Table 100: txfonts/pxfonts Upright Greek Letters

α	\alphaup	θ	\thetaup	π	\piup	ϕ	\phiup
β	\betaup	ϑ	\varthetaup	ϖ	\varpiup	φ	\varphiup
γ	\gammaup	ι	\iotaup	ρ	\rhoup	χ	\chiup
δ	\deltaup	κ	\kappaup	ϱ	\varrhoup	ψ	\psiup
ϵ	\epsilonup	λ	\lambdaup	σ	\sigmaup	ω	\omegaup
ε	\varepsilonup	μ	\muup	ς	\varsigmaup		
ζ	\zetaup	ν	\nuup	τ	\tauup		
η	\etaup	ξ	\xiup	υ	\upsilonup		

Table 101: upgreek Upright Greek Letters

$\upalpha$	\upalpha	$\uptheta$	\uptheta	$\uppi$	\uppi	$\upphi$	\upphi
$\upbeta$	\upbeta	$\upvartheta$	\upvartheta	$\upvarpi$	\upvarpi	$\upvarphi$	\upvarphi
$\upgamma$	\upgamma	$\upiota$	\upiota	$\uprho$	\uprho	$\upchi$	\upchi
$\updelta$	\updelta	$\upkappa$	\upkappa	$\upvarrho$	\upvarrho	$\uppsi$	\uppsi
$\upepsilon$	\upepsilon	$\uplambda$	\uplambda	$\upsigma$	\upsigma	$\upomega$	\upomega
$\upvarepsilon$	\upvarepsilon	$\upmu$	\upmu	$\upvarsigma$	\upvarsigma		
$\upzeta$	\upzeta	$\upnu$	\upnu	$\uptau$	\uptau		
$\upeta$	\upeta	$\upxi$	\upxi	$\upupsilon$	\upupsilon		
$\Upgamma$	\Upgamma	$\Uplambda$	\Uplambda	$\Upsigma$	\Upsigma	$\Uppsi$	\Uppsi
$\Updelta$	\Updelta	$\Upxi$	\Upxi	$\Upupsilon$	\Upupsilon	$\Upomega$	\Upomega
$\Uptheta$	\Uptheta	$\Uppi$	\Uppi	$\Upphi$	\Upphi		

upgreek utilizes upright Greek characters from either the PostScript Symbol font (depicted above) or Euler Roman. As a result, the glyphs may appear slightly different from the above. Contrast, for example, "$\Gamma\Delta\Theta\alpha\beta\gamma$" (Symbol) with "$\Gamma\Delta\Theta\alpha\beta\gamma$" (Euler).

Table 102: txfonts/pxfonts Variant Latin Letters

g	\varg	v	\varv	w	\varw	y	\vary

Pass the varg option to txfonts/pxfonts to replace g, v, w, and y with g, v, w, and y in every mathematical expression in your document.

Table 103: $\mathcal{AMS}$ Hebrew Letters

$\beth$	\beth	$\gimel$	\gimel	$\daleth$	\daleth

\aleph appears in Table 145 on page 44.

Table 104: Letter-like Symbols

$\bot$	\bot	$\forall$	\forall	$\imath$	\imath	$\ni$	\ni	$\top$	\top
ℓ	\ell	$\hbar$	\hbar	$\in$	\in	∂	\partial	$\wp$	\wp
$\exists$	\exists	$\Im$	\Im	$\jmath$	\jmath	$\Re$	\Re		

Table 105: $\mathcal{AMS}$ Letter-like Symbols

$\Bbbk$	\Bbbk	$\complement$	\complement	$\hbar$	\hbar
®	\circledR	$\Finv$	\Finv	$\hslash$	\hslash
Ⓢ	\circledS	$\Game$	\Game	$\nexists$	\nexists

Table 106: txfonts/pxfonts Letter-like Symbols

¢	\mathcent	£	\mathsterling*	∉	\notin	∌	\notni

* It's generally preferable to use the corresponding symbol from Table 3 on page 7 because the symbols in that table work properly in both text mode and math mode.

Table 107: mathabx Letter-like Symbols

$\barin$	\barin	$\in$	\in	$\nottop$	\nottop	$\varnotin$	\varnotin
$\complement$	\complement	$\nexists$	\nexists	$\ni$	\owns	$\varnotowner$	\varnotowner
$\exists$	\exists	$\notbot$	\notbot	$\ownsbar$	\ownsbar		
$\Finv$	\Finv	$\notin$	\notin	∂	\partial		
$\Game$	\Game	$\notowner$	\notowner	$\partialslash$	\partialslash		

Table 108: trfsigns Letter-like Symbols

e	\e	j	\im

Table 109: $\mathcal{AMS}$ Delimiters

⌜	\ulcorner	⌝	\urcorner
⌞	\llcorner	⌟	\lrcorner

Table 110: stmaryrd Delimiters

⟅	\Lbag	⟆	\Rbag	⦇	\lbag	⦈	\rbag
⌈⌈	\llceil	⌉⌉	\rrceil	⌊⌊	\llfloor	⌋⌋	\rrfloor
⦇	\llparenthesis	⦈	\rrparenthesis				

Table 111: mathabx Delimiters

⌜⌞	\lcorners	⌝⌟	\rcorners
⌜	\ulcorner	⌝	\urcorner
⌞	\llcorner	⌟	\lrcorner

Table 112: nath Delimiters

⌞	\niv	⌟	\vin

TABLE 113: Variable-sized Delimiters

↓	⏐	\downarrow	⇓	‖	\Downarrow	[	[	[	]	]	]
⟨	⟨	\langle	⟩	⟩	\rangle	|	⏐	|*	‖	‖	\\|
⌈	⌈	\lceil	⌉	⌉	\rceil	↑	↑	\uparrow	⇑	⇑	\Uparrow
⌊	⌊	\lfloor	⌋	⌋	\rfloor	↕	↕	\updownarrow	⇕	⇕	\Updownarrow
(	(	(	)	)	)	{	{	\{	}	}	\}
/	/	/	\	\	\backslash						

When used with `\left` and `\right`, these symbols expand to the height of the enclosed math expression. Note that `\vert` is a synonym for `|`, and `\Vert` is a synonym for `\|`.

* ε-TEX provides a `\middle` analogue to `\left` and `\right` that can be used to make an internal "|" (often used to indicate "evaluated at") expand to the height of the surrounding `\left` and `\right` symbols. A similar effect can be achieved in conventional LATEX using the braket package.

TABLE 114: Large, Variable-sized Delimiters

∫	∫	\lmoustache	)	)	\rmoustache	(	(	\lgroup	)	)	\rgroup
⏐	⏐	\arrowvert	‖	‖	\Arrowvert	▏	▏	\bracevert			

These symbols *must* be used with `\left` and `\right`. The mathabx package, however, redefines `\lgroup` and `\rgroup` so that those symbols can work without `\left` and `\right`.

TABLE 115: $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ Variable-sized Delimiters

⏐	⏐	\lvert	⏐	⏐	\rvert
‖	‖	\lVert	‖	‖	\rVert

According to the amsmath documentation [AMS99], the preceding symbols are intended to be used as delimiters (e.g., as in "$|-z|$") while the `\vert` and `\Vert` symbols (Table 113) are intended to be used as operators (e.g., as in "$p|q$").

TABLE 116: stmaryrd Variable-sized Delimiters

⟦	⟦	\llbracket	⟧	⟧	\rrbracket

Table 117: mathabx Variable-sized Delimiters

⟦	⟦	\lbbbrack	⟧	⟧	\rbbbrack
❨	❨	\lfilet	❩	❩	\rfilet
|	|	\thickvert	‖	‖	\vvvert

Table 118: nath Variable-sized Delimiters (Double)

⟪	⟪	\lAngle	⟫	⟫	\rAngle
⟦	⟦	\lBrack	⟧	⟧	\rBrack
⌈	⌈	\lCeil	⌉	⌉	\rCeil
⌊	⌊	\lFloor	⌋	⌋	\rFloor
‖	‖	\lVert*	‖	‖	\rVert*

* nath redefines all of the above to include implicit \left and \right commands. Hence, separate \lVert and \rVert commands are needed to disambiguate whether "|" is a left or right delimiter.

All of the symbols in Table 118 can also be expressed using the \double macro. See the nath documentation for examples and additional information.

Table 119: nath Variable-sized Delimiters (Triple)

⟪	⟪	\triple<	⟫	⟫	\triple>
⟦	⟦	\triple[	⟧	⟧	\triple]
‖	‖	\ltriple|*	‖	‖	\rtriple|*

* Similar to \lVert and \rVert in Table 118, \ltriple and \rtriple must be used instead of \triple to disambiguate whether "|" is a left or right delimiter.

Note that \triple—and the corresponding \double—is actually a macro that takes a delimiter as an argument.

TABLE 120: textcomp Text-mode Delimiters

⟨	`\textlangle`	⟩	`\textrangle`
⟦	`\textlbrackdbl`	⟧	`\textrbrackdbl`
⦃	`\textlquill`	⦄	`\textrquill`

TABLE 121: metre Text-mode Delimiters

⦄	`\alad`	⦃	`\Alad`	†	`\crux`	‡	`\Crux`
⦃	`\alas`	⦄	`\Alas`	⟧	`\quadrad`	⟧	`\Quadrad`
⟩	`\angud`	⟩	`\Angud`	⟦	`\quadras`	⟦	`\Quadras`
⟨	`\angus`	⟨	`\Angus`				

TABLE 122: Math-mode Accents

$\acute{a}$	`\acute{a}`	$\check{a}$	`\check{a}`	$\grave{a}$	`\grave{a}`	$\tilde{a}$	`\tilde{a}`
$\bar{a}$	`\bar{a}`	$\ddot{a}$	`\ddot{a}`	$\hat{a}$	`\hat{a}`	$\vec{a}$	`\vec{a}`
$\breve{a}$	`\breve{a}`	$\dot{a}$	`\dot{a}`	$\mathring{a}$	`\mathring{a}`		

Also note the existence of `\imath` and `\jmath`, which produce dotless versions of "$\imath$" and "$\jmath$". (See Table 145 on page 44.) These are useful when the accent is supposed to replace the dot. For example, "`\hat{\imath}`" produces a correct "$\hat{\imath}$", while "`\hat{i}`" would yield the rather odd-looking "$\hat{i}$".

TABLE 123: $\mathcal{AMS}$ Math-mode Accents

$\dddot{a}$	`\dddot{a}`	$\ddddot{a}$	`\ddddot{a}`

These accents are also provided by the mathabx package.

TABLE 124: yhmath Math-mode Accents

$\mathring{a}$	`\ring{a}`

This symbol is largely obsolete, as standard LaTeX 2_ε has supported `\mathring` since June, 1998 [LaT98].

TABLE 125: trfsigns Math-mode Accents

$\vdash\!\!\!

TABLE 126: Extensible Accents

$\widetilde{abc}$	`\widetilde{abc}`*	$\widehat{abc}$	`\widehat{abc}`*
$\overleftarrow{abc}$	`\overleftarrow{abc}`†	$\overrightarrow{abc}$	`\overrightarrow{abc}`†
$\overline{abc}$	`\overline{abc}`	$\underline{abc}$	`\underline{abc}`
$\overbrace{abc}$	`\overbrace{abc}`	$\underbrace{abc}$	`\underbrace{abc}`
$\sqrt{abc}$	`\sqrt{abc}`‡		

As demonstrated in a 1997 TUGboat article about typesetting long-division problems [Gib97], an extensible long-division sign ("$\overline{)abc}$") can be faked by putting a "`\big)`" in a `tabular` environment with an `\hline` or `\cline` in the preceding row. The article also presents a piece of code (uploaded to CTAN as `longdiv.tex`) that automatically solves and typesets—by putting an `\overline` atop "`\big)`" and the desired text—long-division problems. See also the polynom package, which automatically solves and typesets polynomial-division problems in a similar manner.

* Made more extensible by the yhmath package.

† If you're looking for an extensible *diagonal* line or arrow to be used for canceling or reducing mathematical subexpressions (e.g., "$\cancel{x+=x}$" or "$\cancel{3+2}^{5}$") then consider using the cancel package.

‡ With an optional argument, `\sqrt` typesets nth roots. For example, "`\sqrt[3]{abc}`" produces "$\sqrt[3]{abc}$" and "`\sqrt[n]{abc}`" produces "$\sqrt[n]{abc}$".

TABLE 127: overrightarrow Extensible Accents

$\overRightarrow{abc}$	`\Overrightarrow{abc}`

TABLE 128: yhmath Extensible Accents

$\wideparen{abc}$	`\wideparen{abc}`	$\widetriangle{abc}$	`\widetriangle{abc}`
$\overset{\circ}{abc}$	`\widering{abc}`		

TABLE 129: $\mathcal{AMS}$ Extensible Accents

$\overleftrightarrow{abc}$	`\overleftrightarrow{abc}`	$\underleftrightarrow{abc}$	`\underleftrightarrow{abc}`
$\underleftarrow{abc}$	`\underleftarrow{abc}`	$\underrightarrow{abc}$	`\underrightarrow{abc}`

The following are a sort of "reverse accent" in that the argument text serves as a superscript to the arrow. In addition, the optional first argument (not shown) serves as a subscript to the arrow. See the Short Math Guide for LaTeX [Dow00] for further examples.

$\xleftarrow{abc}$	`\xleftarrow{abc}`	$\xrightarrow{abc}$	`\xrightarrow{abc}`

TABLE 130: empheq Extensible Accents

$\overbracket{abc}$	`\overbracket{abc}`	$\underbracket{abc}$	`\underbracket{abc}`

The following are each a sort of "reverse accent" in that the argument text serves as a superscript to the arrows. In addition, the optional first argument (not shown) serves as a subscript to the arrows.

$\xhookleftarrow{abc}$	`\xhookleftarrow{abc}`	$\xleftrightharpoons{abc}$	`\xleftrightharpoons{abc}`
$\xhookrightarrow{abc}$	`\xhookrightarrow{abc}`	$\xmapsto{abc}$	`\xmapsto{abc}`
$\xLeftarrow{abc}$	`\xLeftarrow{abc}`	$\xRightarrow{abc}$	`\xRightarrow{abc}`
$\xleftharpoondown{abc}$	`\xleftharpoondown{abc}`	$\xrightharpoondown{abc}$	`\xrightharpoondown{abc}`
$\xleftharpoonup{abc}$	`\xleftharpoonup{abc}`	$\xrightharpoonup{abc}$	`\xrightharpoonup{abc}`
$\xLeftrightarrow{abc}$	`\xLeftrightarrow{abc}`	$\xrightleftharpoons{abc}$	`\xrightleftharpoons{abc}`
$\xleftrightarrow{abc}$	`\xleftrightarrow{abc}`		

TABLE 131: chemarr Extensible Accents

$\xrightleftharpoons{abc}$	`\xrightleftharpoons{abc}`

`\xrightleftharpoons` is a sort of "reverse accent" in that the argument text serves as a superscript to the arrows. In addition, the optional first argument (not shown) serves as a subscript to the arrows.

TABLE 132: chemarrow Extensible Accents

$\xleftarrow[def]{abc}$	`\autoleftarrow{abc}{def}`	$\xrightarrow[def]{abc}$	`\autorightarrow{abc}{def}`
$\xleftrightharpoons[def]{abc}$	`\autoleftrightharpoons{abc}{def}`	$\xrightleftharpoons[def]{abc}$	`\autorightleftharpoons{abc}{def}`

These symbols are all "reverse accents" in that the two arguments serve, respectively, as a superscript and a subscript to the arrows.

In addition to the symbols shown above, chemarrow also provides `\larrowfill`, `\rarrowfill`, `\leftrightharpoonsfill`, and `\rightleftharpoonsfill` macros. Each of these takes a length argument and produces an arrow of the specified length.

Table 133: mathabx Extensible Accents

$\overbrace{abc}$	`\overbrace{abc}`	$\overline{abc}$	`\widebar{abc}`
$\overgroup{abc}$	`\overgroup{abc}`	$\widecheck{abc}$	`\widecheck{abc}`
$\underbrace{abc}$	`\underbrace{abc}`	$\wideparen{abc}$	`\wideparen{abc}`
$\undergroup{abc}$	`\undergroup{abc}`	$\widering{abc}$	`\widering{abc}`
$\widearrow{abc}$	`\widearrow{abc}`		

The braces shown for `\overbrace` and `\underbrace` appear in their minimum size. They can expand arbitrarily wide, however.

Table 134: esvect Extensible Accents

$\vv{abc}$	`\vv{abc}` with package option `a`
$\vv{abc}$	`\vv{abc}` with package option `b`
$\vv{abc}$	`\vv{abc}` with package option `c`
$\vv{abc}$	`\vv{abc}` with package option `d`
$\vv{abc}$	`\vv{abc}` with package option `e`
$\vv{abc}$	`\vv{abc}` with package option `f`
$\vv{abc}$	`\vv{abc}` with package option `g`
$\vv{abc}$	`\vv{abc}` with package option `h`

esvect also defines a `\vv*` macro which is used to typeset arrows over vector variables with subscripts. See the esvect documentation for more information.

Table 135: undertilde Extensible Accents

$\utilde{abc}$	`\utilde{abc}`

Because `\utilde` is based on `\widetilde` it is also made more extensible by the yhmath package.

Table 136: extarrows Extensible Accents

$\xLeftrightarrow{abc}$	`\xLeftrightarrow{abc}`	$\xLongleftrightarrow{abc}$	`\xLongleftrightarrow{abc}`
$\xleftrightarrow{abc}$	`\xleftrightarrow{abc}`	$\xlongleftrightarrow{abc}$	`\xlongleftrightarrow{abc}`
$\xlongequal{abc}$	`\xlongequal{abc}`	$\xLongrightarrow{abc}$	`\xLongrightarrow{abc}`
$\xLongleftarrow{abc}$	`\xLongleftarrow{abc}`	$\xlongrightarrow{abc}$	`\xlongrightarrow{abc}`
$\xlongleftarrow{abc}$	`\xlongleftarrow{abc}`		

The above are a sort of "reverse accent" in that the argument text serves as a superscript to the arrow. In addition, the optional first argument (not shown) serves as a subscript to the arrow.

TABLE 137: holtpolt Non-commutative Division Symbols

$\left\lfloor \frac{abc}{def} \right\rfloor$	`\holter{abc}{def}`	$\left\lceil \frac{abc}{def} \right\rceil$	`\polter{abc}{def}`

TABLE 138: Dots

$\cdotp$	`\cdotp`	:	`\colon`*	.	`\ldotp`	$\vdots$	`\vdots`†
$\cdots$	`\cdots`	$\ddots$	`\ddots`†	$\ldots$	`\ldots`		

* While ":" is valid in math mode, `\colon` uses different surrounding spacing. See Section 7.3 and the Short Math Guide for LaTeX [Dow00] for more information on math-mode spacing.

† The mathdots package redefines `\ddots` and `\vdots` to make them scale properly with font size. (They normally scale horizontally but not vertically.) `\fixedddots` and `\fixedvdots` provide the original, fixed-height functionality of LaTeX 2$_\varepsilon$'s `\ddots` and `\vdots` macros.

TABLE 139: $\mathcal{AMS}$ Dots

$\cdots$	`\dotsb`	$\cdots$	`\dotsi`	$\ldots$	`\dotso`
$\ldots$	`\dotsc`	$\cdots$	`\dotsm`		

The $\mathcal{AMS}$ dot symbols are named according to their intended usage: `\dotsb` between pairs of binary operators/relations, `\dotsc` between pairs of commas, `\dotsi` between pairs of integrals, `\dotsm` between pairs of multiplication signs, and `\dotso` between other symbol pairs.

TABLE 140: mathdots Dots

$\iddots$	`\iddots`

TABLE 141: yhmath Dots

$\adots$	`\adots`

TABLE 142: mathcomp Math Symbols

℃	`\tccentigrade`	Ω	`\tcohm`	‰	`\tcperthousand`
µ	`\tcmu`	‱	`\tcpertenthousand`		

TABLE 143: mathabx Mayan Digits

𝋀	`\maya{0}`	⁝	`\maya{2}`	⁞	`\maya{4}`
𝋁	`\maya{1}`	⁞	`\maya{3}`	𝋂	`\maya{5}`

TABLE 144: marvosym Math Symbols

0	\MVZero	2	\MVTwo	4	\MVFour	6	\MVSix	8	\MVEight
1	\MVOne	3	\MVThree	5	\MVFive	7	\MVSeven	9	\MVNine

∢	\Anglesign	·	\Squaredot	→	\Vectorarrowhigh
≙	\Corresponds	→	\Vectorarrow		

TABLE 145: Miscellaneous LaTeX 2_ε Math Symbols

ℵ	\aleph	◇	\Diamond*	∞	\infty	′	\prime
∠	\angle	♢	\diamondsuit	℧	\mho*	♯	\sharp
\	\backslash	∅	\emptyset‡	∇	\nabla	♠	\spadesuit
□	\Box*,†	♭	\flat	♮	\natural	√	\surd
♣	\clubsuit	♡	\heartsuit	¬	\neg	△	\triangle

* Not predefined in LaTeX 2_ε. Use one of the packages latexsym, amsfonts, amssymb, txfonts, pxfonts, or wasysym.

† To use \Box—or any other symbol—as an end-of-proof (Q.E.D.) marker, consider using the ntheorem package, which properly juxtaposes a symbol with the end of the proof text.

‡ Many people prefer the look of $\mathcal{AMS}$'s \varnothing (Table 146) to that of LaTeX's \emptyset.

TABLE 146: Miscellaneous $\mathcal{AMS}$ Math Symbols

∠	\angle	▼	\blacktriangledown	℧	\mho
‵	\backprime	╲	\diagdown	◁	\sphericalangle
★	\bigstar	╱	\diagup	□	\square
⧫	\blacklozenge	ð	\eth	▽	\triangledown
■	\blacksquare	◊	\lozenge	∅	\varnothing
▲	\blacktriangle	∡	\measuredangle	△	\vartriangle

TABLE 147: Miscellaneous wasysym Math Symbols

□	\Box	℧	\mho*	∴	\wasytherefore
◇	\Diamond	∢	\varangle		

* wasysym also defines an \agemO symbol, which is the same glyph as \mho but is intended for use in text mode.

TABLE 148: Miscellaneous txfonts/pxfonts Math Symbols

◆	\Diamondblack	ƛ	\lambdaslash	♥	\varheartsuit
⟐	\Diamonddot	♧	\varclubsuit	♤	\varspadesuit
ƛ	\lambdabar	♦	\vardiamondsuit		

Table 149: Miscellaneous mathabx Math Symbols

∘	\degree	⫽	\fourth	∡	\measuredangle	″	\second
⧹	\diagdown	#	\hash	⋔	\pitchfork	∢	\sphericalangle
⧸	\diagup	∞	\infty	∝	\propto	‴	\third
∅	\diameter	⋉	\leftthreetimes	⋋	\rightthreetimes	#	\varhash

Table 150: Miscellaneous textcomp Text-mode Math Symbols

°	\textdegree*	½	\textonehalf†	¾	\textthreequarters†
÷	\textdiv	¼	\textonequarter†	³	\textthreesuperior
/	\textfractionsolidus	¹	\textonesuperior	×	\texttimes
¬	\textlnot	±	\textpm	²	\texttwosuperior
−	\textminus	√	\textsurd		

* If you prefer a larger degree symbol you might consider defining one as "\ensuremath{^\circ}" ("°").

† nicefrac (part of the units package) can be used to construct vulgar fractions like "1/2", "1/4", "3/4", and even "c/o".

Table 151: Math Alphabets

Font sample	Generating command	Required package
ABCdef123	`\mathrm{ABCdef123}`	*none*
$ABCdef123$	`\mathit{ABCdef123}`	*none*
$ABCdef123$	`\mathnormal{ABCdef123}`	*none*
$\mathcal{ABC}$	`\mathcal{ABC}`	*none*
$\mathscr{ABC}$	`\mathscr{ABC}`	mathrsfs
or	`\mathcal{ABC}`	calrsfs
$\mathcal{ABC}$	`\mathcal{ABC}`	euscript with the mathcal option
or	`\mathscr{ABC}`	euscript with the mathscr option
$\mathpzc{ABCdef123}$	`\mathpzc{ABCdef123}`	*none*; manually defined*
$\mathbb{ABC}$	`\mathbb{ABC}`	amsfonts,§ amssymb, txfonts, or pxfonts
$\mathbf{\mathbb{ABC}}$	`\varmathbb{ABC}`	txfonts or pxfonts
$\mathbb{ABCdef123}$	`\mathbb{ABCdef123}`	bbold or mathbbol†
$\mathbb{ABCdef123}$	`\mathbb{ABCdef123}`	mbboard†
$\mathbb{ABCdef12}$	`\mathbbm{ABCdef12}`	bbm
$\mathbb{ABCdef12}$	`\mathbbmss{ABCdef12}`	bbm
$\mathbb{ABCdef12}$	`\mathbbmtt{ABCdef12}`	bbm
$\mathbb{ABC1}$	`\mathds{ABC1}`	dsfont
$\mathbf{\mathbb{ABC1}}$	`\mathds{ABC1}`	dsfont with the sans option
$\mathfrak{ABCdef123}$	`\mathfrak{ABCdef123}`	eufrak
$\mathfrak{ABCdef123}$	`\textfrak{ABCdef123}`	yfonts‡
$\mathbf{\mathfrak{ABCdef123}}$	`\textswab{ABCdef123}`	yfonts‡
$\mathbf{\mathfrak{ABCdef123}}$	`\textgoth{ABCdef123}`	yfonts‡

* Put "`\DeclareMathAlphabet{\mathpzc}{OT1}{pzc}{m}{it}`" in your document's preamble to make `\mathpzc` typeset its argument in Zapf Chancery.

† The mathbbol package defines some additional blackboard bold characters: parentheses, square brackets, angle brackets, and—if the bbgreekl option is passed to matbbol—Greek letters. For instance, "$\lessdot[\![(\alpha\beta\gamma)]\!]\gtrdot$" is produced by "`\mathbb{\Langle\Lbrack\Lparen\bbalpha\bbbeta\bbgamma\Rparen\Rbrack\Rangle}`".

mbboard extends the blackboard bold symbol set significantly further. It supports not only the Greek alphabet—including "Greek-like" symbols such as `\bbnabla` ("∇")—but also *all* punctuation marks, various currency symbols such as `\bbdollar` ("$") and `\bbeuro` ("€"), and the Hebrew alphabet (e.g., "`\bbfinalnun\bbyod\bbqof\bbpe`" → "ן׳ק׳ף").

‡ As their `\text...` names imply, the fonts provided by the yfonts package are actually text fonts. They are included in Table 151 because they are frequently used in a mathematical context.

§ An older (i.e., prior to 1991) version of the $\mathcal{AMS}$'s fonts rendered $\mathbb{C}$, $\mathbb{N}$, $\mathbb{R}$, $\mathbb{S}$, and $\mathbb{Z}$ as $\mathbb{C}$, $\mathbb{N}$, $\mathbb{R}$, $\mathbb{S}$, and $\mathbb{Z}$. As some people prefer the older glyphs—much to the $\mathcal{AMS}$'s surprise—and because those glyphs fail to build under modern versions of METAFONT, Berthold Horn uploaded PostScript fonts for the older blackboard-bold glyphs to CTAN, to the `fonts/msym10` directory. As of this writing, however, there are no LaTeX 2ε packages for utilizing the now-obsolete glyphs.

4 Science and technology symbols

This section lists symbols that are employed in various branches of science and engineering (and, because we were extremely liberal in our classification, astrology, too).

Table 152: gensymb Symbols Defined to Work in Both Math and Text Mode

℃	`\celsius`	µ	`\micro`	‰	`\perthousand`
°	`\degree`	Ω	`\ohm`		

Table 153: wasysym Electrical and Physical Symbols

∼	`\AC`	≋	`\VHF`	∿∿∿	`\photon`	F	`\HF`	⌒⌒⌒⌒⌒	`\gluon`

Table 154: ifsym Pulse Diagram Symbols

⌝	`\FallingEdge`	⌝⌞⌜	`\LongPulseLow`	⌝⌞⌜	`\PulseLow`	⌟⌞	`\ShortPulseHigh`
⌟⌜⌞	`\LongPulseHigh`	⌟⌞	`\PulseHigh`	⌟⌜	`\RaisingEdge`	⌝⌜	`\ShortPulseLow`

In addition, within `\textifsym{...}`, the following codes are valid:

_	l	‾	m	‾	h	‾ _	d	⟨	<	⟩	>
__	L	—	M	—	H	— _	D	⟨	<<	⟩	>>

This enables one to write "`\textifsym{mm<DDD>mm}`" to get "—⟨———⟩—" or "`\textifsym{L|H|L|H|L}`" to get "_⌟⌝_⌟⌝_". See also the timing package, which provides a wide variety of pulse-diagram symbols within an environment designed specifically for typesetting pulse diagrams.

Finally, `\textifsym` supports the display of segmented digits, as would appear on an LCD: "`\textifsym{-123.456}`" produces "- 123.456". "`\textifsym{b}`" outputs a blank with the same width as an "8".

Table 155: ar Aspect Ratio Symbol

Æ `\AR`

Table 156: textcomp Text-mode Science and Engineering Symbols

℃ `\textcelsius` ℧ `\textmho` µ `\textmu` Ω `\textohm`

Table 157: wasysym Astronomical Symbols

☊	\ascnode	♃	\jupiter	●	\newmoon	♀	\venus
⊙	\astrosun	☾	\leftmoon	♇	\pluto	♈	\vernal
☋	\descnode	♂	\mars	☽	\rightmoon		
♁	\earth	☿	\mercury	♄	\saturn		
○	\fullmoon	♆	\neptune	♅	\uranus		

Table 158: marvosym Astronomical Symbols

☿	\Mercury	♂	\Mars	♅	\Uranus	☉	\Sun
♀	\Venus	♃	\Jupiter	♆	\Neptune	☽	\Moon
♁	\Earth	♄	\Saturn	♇	\Pluto		

Table 159: mathabx Astronomical Symbols

☿	\Mercury	⊕	\Earth	♃	\Jupiter	♅	\Uranus	♇	\Pluto
♀	\Venus	♂	\Mars	♄	\Saturn	♆	\Neptune		
○	\fullmoon	☾	\leftmoon	●	\newmoon	☽	\rightmoon		
⊙	\Sun	♁	\varEarth						

mathabx also defines \girl as an alias for \Venus, \boy as an alias for \Mars, and \Moon as an alias for \leftmoon.

Table 160: wasysym Astrological Symbols

♈	\aries	♋	\cancer	♎	\libra	♑	\capricornus
♉	\taurus	♌	\leo	♏	\scorpio	≈	\aquarius
♊	\gemini	♍	\virgo	➶	\sagittarius	♓	\pisces

☌	\conjunction	☍	\opposition

Table 161: marvosym Astrological Symbols

♈	\Aries	♋	\Cancer	♎	\Libra	♑	\Capricorn
♉	\Taurus	♌	\Leo	♏	\Scorpio	♒	\Aquarius
♊	\Gemini	♍	\Virgo	➶	\Sagittarius	♓	\Pisces

Note that \Aries...\Pisces can also be specified with \Zodiac{1}... \Zodiac{12}.

Table 162: mathabx Astrological Symbols

♈	\Aries	♉	\Taurus	♊	\Gemini

TABLE 163: wasysym APL Symbols

⍞	\APLbox	⍁	\APLinv	⋆	\APLstar
⍝	\APLcomment	⍇	\APLleftarrowbox	⍋	\APLup
⍛	\APLdown	⍟	\APLlog	⍐	\APLuparrowbox
⍗	\APLdownarrowbox	¯	\APLminus	⍀	\notbackslash
⍠	\APLinput	⍈	\APLrightarrowbox	⌿	\notslash

TABLE 164: wasysym APL Modifiers

○	\APLcirc{}	∼	\APLnot{}	|	\APLvert{}

TABLE 165: marvosym Computer Hardware Symbols

	\ComputerMouse		\ParallelPort		\SerialInterface
	\Keyboard		\Printer		\SerialPort

TABLE 166: ascii Control Characters (IBM)

☺	\SOH	•	\BEL	♪	\CR	‼	\DCc	↓	\EM	▾	\US
☻	\STX	◘	\BS	♬	\SO	¶	\DCd	→	\SUB	¦	\splitvert
♥	\ETX	T	\HT	☼	\SI	§	\NAK	←	\ESC	⌂	\DEL
♦	\EOT	◙	\LF	►	\DLE	▬	\SYN	└	\FS		
♣	\ENQ	♂	\VT	◄	\DCa	↨	\ETB	↔	\GS		
♠	\ACK	♀	\FF	↕	\DCb	↑	\CAN	▲	\RS		

SOH, STX, ETX, ..., US are the names of ASCII characters 1–31. DEL is the name of ASCII character 127. \splitvert doesn't correspond to a control character but is merely the "|" character shown IBM style.

These characters must be entered with the ascii font in effect, for example, "{\ascii\STX}". See the ascii package documentation for more information.

TABLE 167: marvosym Communication Symbols

	\Email	FAX	\fax		\Faxmachine		\Lightning		\Pickup
	\Emailct	FAX	\FAX	✉	\Letter		\Mobilefone	☎	\Telefon

TABLE 168: marvosym Engineering Symbols

	\Beam		\Force	●	\Octosteel	I	\RoundedTTsteel
	\Bearing	⬣	\Hexasteel	◘	\Rectpipe	◘	\Squarepipe
○	\Circpipe	ʕ	\Lefttorque	■	\Rectsteel	■	\Squaresteel
●	\Circsteel		\Lineload	ʔ	\Righttorque	T	\Tsteel
	\Fixedbearing		\Loosebearing	T	\RoundedLsteel*	I	\TTsteel
▬	\Flatsteel	L	\Lsteel	L	\RoundedTsteel*		

* \RoundedLsteel and \RoundedTsteel seem to be swapped, at least in the 2000/05/01 version of marvosym.

TABLE 169: wasysym Biological Symbols

♀	\female	♂	\male

TABLE 170: marvosym Biological Symbols

⚲	\Female	⚣	\FemaleMale	⚷	\MALE	⚬	\Neutral
⚢	\FEMALE	⚥	\Hermaphrodite	⚦	\Male		
⚤	\FemaleFemale	⚧	\HERMAPHRODITE	⚤	\MaleMale		

TABLE 171: marvosym Safety-related Symbols

☣	\Biohazard	CE	\CEsign	Ex	\Explosionsafe	☢	\Radioactivity
BSE	\BSEfree	⚠	\Estatically		\Laserbeam	STOP	\Stopsign

5 Dingbats

Dingbats are symbols such as stars, arrows, and geometric shapes. They are commonly used as bullets in itemized lists or, more generally, as a means to draw attention to the text that follows.

The pifont dingbat package warrants special mention. Among other capabilities, pifont provides a LaTeX interface to the Zapf Dingbats font (one of the standard 35 PostScript fonts). However, rather than name each of the dingbats individually, pifont merely provides a single `\ding` command, which outputs the character that lies at a given position in the font. The consequence is that the pifont symbols can't be listed by name in this document's index, so be mindful of that fact when searching for a particular symbol.

Table 172: bbding Arrows

➥	\ArrowBoldDownRight	➧	\ArrowBoldRightShort	➦	\ArrowBoldUpRight
➲	\ArrowBoldRightCircled	➠	\ArrowBoldRightStrobe		

Table 173: pifont Arrows

➔	\ding{212}	→	\ding{221}	➦	\ding{230}	⇨	\ding{239}	➶	\ding{249}
→	\ding{213}	➙	\ding{222}	➧	\ding{231}	⇨	\ding{241}	→	\ding{250}
↔	\ding{214}	➛	\ding{223}	➨	\ding{232}	➲	\ding{242}	➔	\ding{251}
↕	\ding{215}	➠	\ding{224}	⇨	\ding{233}	⇨	\ding{243}	➨	\ding{252}
➘	\ding{216}	➨	\ding{225}	➪	\ding{234}	➘	\ding{244}	➩	\ding{253}
➔	\ding{217}	➢	\ding{226}	➪	\ding{235}	➙	\ding{245}	➢	\ding{254}
➚	\ding{218}	➢	\ding{227}	➪	\ding{236}	➶	\ding{246}		
→	\ding{219}	➤	\ding{228}	⇨	\ding{237}	➘	\ding{247}		
➔	\ding{220}	➥	\ding{229}	⇨	\ding{238}	➙	\ding{248}		

Table 174: marvosym Scissors

✁	\Cutleft	✂	\Cutright	✁	\Leftscissors
---	\Cutline	---	\Kutline	✂	\Rightscissors

Table 175: bbding Scissors

✃	\ScissorHollowLeft	✄	\ScissorLeftBrokenTop
✂	\ScissorHollowRight	✂	\ScissorRight
✄	\ScissorLeft	✄	\ScissorRightBrokenBottom
✄	\ScissorLeftBrokenBottom	✄	\ScissorRightBrokenTop

Table 176: pifont Scissors

✄	\ding{33}	✁	\ding{34}	✄	\ding{35}	✁	\ding{36}

Table 177: dingbat Pencils

\largepencil \smallpencil

Table 178: bbding Pencils and Nibs

\NibLeft	\PencilLeft	\PencilRightDown
\NibRight	\PencilLeftDown	\PencilRightUp
\NibSolidLeft	\PencilLeftUp	
\NibSolidRight	\PencilRight	

Table 179: pifont Pencils and Nibs

\ding{46} \ding{47} \ding{48} \ding{49} \ding{50}

Table 180: dingbat Hands

\leftpointright	\rightpointleft	\rightpointright
\leftthumbsdown	\rightthumbsdown	
\leftthumbsup	\rightthumbsup	

Table 181: bbding Hands

\HandCuffLeft	\HandCuffRightUp	\HandPencilLeft
\HandCuffLeftUp	\HandLeft	\HandRight
\HandCuffRight	\HandLeftUp	\HandRightUp

Table 182: pifont Hands

\ding{42} \ding{43} \ding{44} \ding{45}

Table 183: bbding Crosses and Plusses

\Cross	\CrossOpenShadow	\PlusOutline
\CrossBoldOutline	\CrossOutline	\PlusThinCenterOpen
\CrossClowerTips	\Plus	
\CrossMaltese	\PlusCenterOpen	

Table 184: pifont Crosses and Plusses

\ding{57}	\ding{59}	\ding{61}	\ding{63}
\ding{58}	\ding{60}	\ding{62}	\ding{64}

Table 185: bbding Xs and Check Marks

\Checkmark	\XSolid	\XSolidBrush
\CheckmarkBold	\XSolidBold	

TABLE 186: pifont Xs and Check Marks

✓	\ding{51}	✗	\ding{53}	✗	\ding{55}
✔	\ding{52}	✘	\ding{54}	✘	\ding{56}

TABLE 187: wasysym Xs and Check Marks

☑	\CheckedBox	☐	\Square	☒	\XBox

TABLE 188: pifont Circled Numbers

①	\ding{172}	❶	\ding{182}	①	\ding{192}	❶	\ding{202}
②	\ding{173}	❷	\ding{183}	②	\ding{193}	❷	\ding{203}
③	\ding{174}	❸	\ding{184}	③	\ding{194}	❸	\ding{204}
④	\ding{175}	❹	\ding{185}	④	\ding{195}	❹	\ding{205}
⑤	\ding{176}	❺	\ding{186}	⑤	\ding{196}	❺	\ding{206}
⑥	\ding{177}	❻	\ding{187}	⑥	\ding{197}	❻	\ding{207}
⑦	\ding{178}	❼	\ding{188}	⑦	\ding{198}	❼	\ding{208}
⑧	\ding{179}	❽	\ding{189}	⑧	\ding{199}	❽	\ding{209}
⑨	\ding{180}	❾	\ding{190}	⑨	\ding{200}	❾	\ding{210}
⑩	\ding{181}	❿	\ding{191}	⑩	\ding{201}	❿	\ding{211}

pifont (part of the psnfss package) provides a `dingautolist` environment which resembles `enumerate` but uses circled numbers as bullets.[2] See the psnfss documentation for more information.

TABLE 189: wasysym Stars

✡	\davidsstar	✳	\hexstar	✳	\varhexstar

TABLE 190: bbding Stars, Flowers, and Similar Shapes

✻	\Asterisk	✿	\FiveFlowerPetal	✢	\JackStar
✱	\AsteriskBold	★	\FiveStar	✤	\JackStarBold
✲	\AsteriskCenterOpen	☆	\FiveStarCenterOpen	✾	\SixFlowerAlternate
✽	\AsteriskRoundedEnds	✭	\FiveStarConvex	❋	\SixFlowerAltPetal
✳	\AsteriskThin	✮	\FiveStarLines	✼	\SixFlowerOpenCenter
✳	\AsteriskThinCenterOpen	☆	\FiveStarOpen	❀	\SixFlowerPetalDotted
✡	\DavidStar	✪	\FiveStarOpenCircled	✻	\SixFlowerPetalRemoved
✸	\DavidStarSolid	✯	\FiveStarOpenDotted	❀	\SixFlowerRemovedOpenPetal
✳	\EightAsterisk	✯	\FiveStarOutline	✶	\SixStar
❁	\EightFlowerPetal	✭	\FiveStarOutlineHeavy	✺	\SixteenStarLight
✻	\EightFlowerPetalRemoved	✰	\FiveStarShadow	❄	\Snowflake
✷	\EightStar	✢	\FourAsterisk	❅	\SnowflakeChevron
✸	\EightStarBold	❀	\FourClowerOpen	❆	\SnowflakeChevronBold
✹	\EightStarConvex	✤	\FourClowerSolid	✻	\Sparkle
✶	\EightStarTaper	✦	\FourStar	✼	\SparkleBold
❀	\FiveFlowerOpen	✧	\FourStarOpen	✸	\TwelweStar

[2] In fact, `dingautolist` can use any set of consecutive Zapf Dingbats symbols.

TABLE 191: pifont Stars, Flowers, and Similar Shapes

✡	\ding{65}	✪	\ding{74}	✳	\ding{83}	✲	\ding{92}	❃	\ding{101}
✢	\ding{66}	✯	\ding{75}	✴	\ding{84}	✻	\ding{93}	❄	\ding{102}
✣	\ding{67}	✰	\ding{76}	✵	\ding{85}	✼	\ding{94}	❅	\ding{103}
✤	\ding{68}	✱	\ding{77}	✶	\ding{86}	✽	\ding{95}	❆	\ding{104}
✥	\ding{69}	✲	\ding{78}	✷	\ding{87}	✾	\ding{96}	❇	\ding{105}
✦	\ding{70}	✳	\ding{79}	✸	\ding{88}	✿	\ding{97}	❈	\ding{106}
✧	\ding{71}	✴	\ding{80}	✹	\ding{89}	❀	\ding{98}	❉	\ding{107}
★	\ding{72}	✵	\ding{81}	✺	\ding{90}	❁	\ding{99}		
☆	\ding{73}	✶	\ding{82}	✻	\ding{91}	❂	\ding{100}		

TABLE 192: wasysym Geometric Shapes

⬡ \hexagon ◯ \octagon ⬠ \pentagon ⬡ \varhexagon

TABLE 193: ifsym Geometric Shapes

◯	\BigCircle	▶	\FilledBigTriangleRight	○	\SmallCircle
╳	\BigCross	▲	\FilledBigTriangleUp	×	\SmallCross
◇	\BigDiamondshape	●	\FilledCircle	◇	\SmallDiamondshape
—	\BigHBar	◈	\FilledDiamondShadowA	–	\SmallHBar
⬙	\BigLowerDiamond	◈	\FilledDiamondShadowC	⬙	\SmallLowerDiamond
◈	\BigRightDiamond	◆	\FilledDiamondshape	◈	\SmallRightDiamond
□	\BigSquare	●	\FilledSmallCircle	□	\SmallSquare
▽	\BigTriangleDown	◆	\FilledSmallDiamondshape	▽	\SmallTriangleDown
◁	\BigTriangleLeft	■	\FilledSmallSquare	◁	\SmallTriangleLeft
▷	\BigTriangleRight	▼	\FilledSmallTriangleDown	▷	\SmallTriangleRight
△	\BigTriangleUp	◀	\FilledSmallTriangleLeft	△	\SmallTriangleUp
|	\BigVBar	▶	\FilledSmallTriangleRight	|	\SmallVBar
○	\Circle	▲	\FilledSmallTriangleUp	↓	\SpinDown
╳	\Cross	■	\FilledSquare	↑	\SpinUp
◈	\DiamondShadowA	■	\FilledSquareShadowA	□	\Square
◈	\DiamondShadowB	■	\FilledSquareShadowC	▣	\SquareShadowA
◈	\DiamondShadowC	▼	\FilledTriangleDown	▣	\SquareShadowB
◇	\Diamondshape	◀	\FilledTriangleLeft	▣	\SquareShadowC
●	\FilledBigCircle	▶	\FilledTriangleRight	▽	\TriangleDown
◆	\FilledBigDiamondshape	▲	\FilledTriangleUp	◁	\TriangleLeft
■	\FilledBigSquare	—	\HBar	▷	\TriangleRight
▼	\FilledBigTriangleDown	⬙	\LowerDiamond	△	\TriangleUp
◀	\FilledBigTriangleLeft	◈	\RightDiamond	|	\VBar

The ifsym documentation points out that one can use \rlap to combine some of the above into useful, new symbols. For example, \BigCircle and \FilledSmallCircle combine to give "◉". Likewise, \Square and \Cross combine to give "⊠". See Section 7.2 for more information about constructing new symbols out of existing symbols.

TABLE 194: bbding Geometric Shapes

○	\CircleShadow	▌	\Rectangle	❑	\SquareShadowTopLeft
●	\CircleSolid	▮	\RectangleBold	❒	\SquareShadowTopRight
◆	\DiamondSolid	▏	\RectangleThin	■	\SquareSolid
⬭	\Ellipse	□	\Square	▼	\TriangleDown
⬭	\EllipseShadow	❑	\SquareCastShadowBottomRight	▲	\TriangleUp
⬬	\EllipseSolid	❑	\SquareCastShadowTopLeft		
◖	\HalfCircleLeft	❒	\SquareCastShadowTopRight		
◗	\HalfCircleRight	❑	\SquareShadowBottomRight		

TABLE 195: pifont Geometric Shapes

●	\ding{108}	❑	\ding{111}	❒	\ding{114}	◆	\ding{117}	▏	\ding{121}
○	\ding{109}	❒	\ding{112}	▲	\ding{115}	◗	\ding{119}	▮	\ding{122}
■	\ding{110}	❑	\ding{113}	▼	\ding{116}	|	\ding{120}		

TABLE 196: universa Geometric Shapes

● \baucircle ■ \bausquare ▲ \bautriangle

TABLE 197: manfnt Dangerous Bend Symbols

\dbend \lhdbend \reversedvideodbend

Note that these symbols descend far beneath the baseline. manfnt also defines non-descending versions, which it calls, correspondingly, \textdbend, \textlhdbend, and \textreversedvideodbend.

TABLE 198: skull Symbols

\skull

TABLE 199: Non-Mathematical mathabx Symbols

 \rip

TABLE 200: marvosym Information Symbols

	\Bicycle		\Football		\Pointinghand
	\Checkedbox		\Gentsroom		\Wheelchair
	\Clocklogo		\Industry		\Writinghand
	\Coffeecup		\Info		
	\Crossedbox		\Ladiesroom		

Table 201: Miscellaneous dingbat Dingbats

⚓	\anchor	👁	\eye	▤	\Sborder
♪	\carriagereturn	✹	\filledsquarewithdots	⚂	\squarewithdots
✓	\checkmark	📡	\satellitedish	▥	\Zborder

Table 202: Miscellaneous bbding Dingbats

✉	\Envelope	✌	\Peace	✆	\PhoneHandset	✪	\SunshineOpenCircled
❖	\OrnamentDiamondSolid	☎	\Phone	✈	\Plane	☯	\Tape

Table 203: Miscellaneous pifont Dingbats

✎	\ding{37}	✍	\ding{40}	❤	\ding{164}	❧	\ding{167}	♠	\ding{171}
✆	\ding{38}	✉	\ding{41}	❥	\ding{165}	♣	\ding{168}	♦	\ding{169}
✇	\ding{39}	❖	\ding{118}	❦	\ding{166}	♥	\ding{170}		

6 Other symbols

The following are all the symbols that didn't fit neatly or unambiguously into any of the previous sections. (Do weather symbols belong under "Science and technology"? Should dice be considered "mathematics"?) While some of the tables contain clearly related groups of symbols (e.g., musical notes), others represent motley assortments of whatever the font designer felt like drawing.

Table 204: textcomp Genealogical Symbols

⋆	\textborn	⚮	\textdivorced	⚭	\textmarried
†	\textdied	🙶	\textleaf		

Table 205: wasysym General Symbols

🙰	\ataribox	🕒	\clock	◀	\LEFTarrow	☺	\smiley
🔔	\bell	⌀	\diameter	ϟ	\lightning	☼	\sun
☻	\blacksmiley	▼	\DOWNarrow	☎	\phone	▲	\UParrow
⋈	\Bowtie	☹	\frownie	➪	\pointer	⌑	\wasylozenge
¦	\brokenvert	⦸	\invdiameter	⌕	\recorder		
✓	\checked	✠	\kreuz	▶	\RIGHTarrow		

Table 206: wasysym Circles

●	\CIRCLE	◐	\LEFTcircle	◑	\RIGHTcircle	↻	\rightturn
○	\Circle	◖	\Leftcircle	◗	\Rightcircle		
◖	\LEFTCIRCLE	◗	\RIGHTCIRCLE	↺	\leftturn		

Table 207: wasysym Musical Symbols

♪	\eighthnote	𝅗𝅥	\halfnote	♫	\twonotes	𝅝	\fullnote	♩	\quarternote

See also \flat, \sharp, and \natural (Table 145 on page 44).

Table 208: harmony Musical Symbols

𝅘𝅥𝅯𝅘𝅥𝅯	\AAcht	𝄪	\Ds	.	\Pu	>	\VM
𝅘𝅥𝅯	\Acht	𝄫	\DS	𝅘𝅥𝅰	\Sech	𝅘𝅥𝅱	\Zwdr
𝄾	\AcPa	𝅝	\Ganz	𝄿	\SePa	𝅀	\ZwPa
𝅜	\DD	𝄻	\GaPa	<	\UB		
𝅜	\DDohne	𝅗𝅥	\Halb	𝅘𝅥	\Vier		
𝅗	\Dohne	𝄼	\HaPa	𝄽	\ViPa		

The musixtex package must be installed to use harmony.

TABLE 209: harmony Musical Accents

Äa	\Ferli{A}\Ferli{a}*	Äa	\Ohne{A}\Ohne{a}*
Äa	\Fermi{A}\Fermi{a}	A a	\Umd{A}\Umd{a}*
Ⓐⓐ	\Kr{A}\Kr{a}		

* These symbols take an optional argument which shifts the accent either horizontally or vertically (depending on the command) by the given distance.

In addition to the accents shown above, \HH is a special accent command which accepts five period-separated characters and typesets them such that "\HH.X.a.b.c.d." produces "X_a^b". All arguments except the first can be omitted: "\HH.X....." produces "X". \Takt takes two arguments and composes them into a musical time signature. For example, "\Takt{12}{8}" produces "$\frac{12}{8}$". As two special cases, "\Takt{c}{0}" produces "𝐂" and "\Takt{c}{1}" produces "𝐂".

The musixtex package must be installed to use harmony.

TABLE 210: Miscellaneous manfnt Symbols

	\manboldkidney		\manpenkidney
	\manconcentriccircles		\manquadrifolium
	\manconcentricdiamond		\manquartercircle
	\mancone		\manrotatedquadrifolium
	\mancube		\manrotatedquartercircle
	\manerrarrow		\manstar
	\manfilledquartercircle		\mantiltpennib
	\manhpennib		\mantriangledown
	\manimpossiblecube		\mantriangleright
	\mankidney		\mantriangleup
	\manlhpenkidney		\manvpennib

TABLE 211: marvosym Navigation Symbols

▶	\Forward	▼	\MoveDown	⏮	\RewindToIndex	⏫	\ToTop
⏭	\ForwardToEnd	▲	\MoveUp	⏮	\RewindToStart		
⏭⏭	\ForwardToIndex	◀	\Rewind	⏬	\ToBottom		

TABLE 212: marvosym Laundry Symbols

40	\AtForty		\Handwash	95	\ShortNinetyFive
95	\AtNinetyFive		\IroningI	60	\ShortSixty
60	\AtSixty		\IroningII	30	\ShortThirty
△	\Bleech		\IroningIII	40	\SpecialForty
Ⓐ	\CleaningA		\NoBleech		\Tumbler
Ⓕ	\CleaningF		\NoChemicalCleaning		\WashCotton
Ⓕ	\CleaningFF		\NoIroning		\WashSynthetics
Ⓟ	\CleaningP		\NoTumbler		\WashWool
Ⓟ	\CleaningPP	50	\ShortFifty		
	\Dontwash	40	\ShortForty		

Table 213: Other marvosym Symbols

☥	\Ankh	✝	\Cross	♡	\Heart	☺	\Smiley
🦇	\Bat		\FHBOlogo		\MartinVogel		\Womanface
	\Bouquet		\FHBOLOGO		\Mundus	☯	\Yinyang
✞	\Celtcross	☹	\Frowny	@	\MVAt		
Ⓐ	\CircledA		\FullFHBO	➔	\Rightarrow*		

* Standard LaTeX 2_ε defines \Rightarrow to display "⇒", while marvosym redefines it to display "➔" (or ":" in math mode). This conflict can be problematic for math symbols defined in terms of \Rightarrow, such as \Longleftrightarrow, which ends up looking like "⇐:".

Table 214: Miscellaneous universa Symbols

\bauforms \bauhead

Table 215: ifsym Weather Symbols

	\Cloud		\Hail		\Sleet		\WeakRain
	\FilledCloud		\HalfSun		\Snow		\WeakRainCloud
	\FilledRainCloud		\Lightning		\SnowCloud		\FilledSnowCloud
	\FilledSunCloud		\NoSun		\Sun		
	\FilledWeakRainCloud		\Rain		\SunCloud		
	\Fog		\RainCloud		\ThinFog		

In addition, \Thermo{0}...\Thermo{6} produce thermometers that are between 0/6 and 6/6 full of mercury:

Similarly, \wind{⟨*sun*⟩}{⟨*angle*⟩}{⟨*strength*⟩} will draw wind symbols with a given amount of sun (0–4), a given angle (in degrees), and a given strength in km/h (0–100). For example, \wind{0}{0}{0} produces "", \wind{2}{0}{0} produces "", and \wind{4}{0}{100} produces "".

Table 216: ifsym Alpine Symbols

✝	\SummitSign		\Summit		\SurveySign		\HalfFilledHut
	\StoneMan		\Mountain		\Joch		\VarSummit
	\Hut		\IceMountain		\Flag		
	\FilledHut		\VarMountain		\VarFlag		
	\Village		\VarIceMountain		\Tent		

Table 217: ifsym Clocks

	\Interval		\StopWatchStart		\VarClock		\Wecker
	\StopWatchEnd		\Taschenuhr		\VarTaschenuhr		

ifsym also exports a \showclock macro. \showclock{⟨*hours*⟩}{⟨*minutes*⟩} outputs a clock displaying the corresponding time. For instance, "\showclock{5}{40}" produces "". ⟨*hours*⟩ must be an integer from 0 to 11, and ⟨*minutes*⟩ must be an integer multiple of 5 from 0 to 55.

Table 218: Other ifsym Symbols

	\FilledSectioningDiamond		\Letter		\Radiation
	\Fire		\PaperLandscape		\SectioningDiamond
	\Irritant		\PaperPortrait		\Telephone
	\StrokeOne		\StrokeThree		\StrokeFive
	\StrokeTwo		\StrokeFour		

In addition, \Cube{1}...\Cube{6} produce dice with the corresponding number of spots:

Table 219: skak Chess Informator Symbols

∓	\bbetter	○ ○	\doublepawns	N	\novelty	R	\various
−+	\bdecisive	⊥	\ending	□	\onlymove	±	\wbetter
⌓	\betteris	=	\equal		\opposbishops	+−	\wdecisive
	\bishoppair	‖	\etc		\passedpawn	×	\weakpt
∓	\bupperhand	⇔	\file	«	\qside	⌟	\with
⊞	\centre	»	\kside		\samebishops	→	\withattack
RR	\comment	×	\markera	—	\see	△	\withidea
≅	\compensation	○	\markerb	○–○	\seppawns	↑	\withinit
⇆	\counterplay	#	\mate	⊕	\timelimit	∟	\without
↻	\devadvantage	>	\morepawns	∞	\unclear	±	\wupperhand
⟋	\diagonal	○	\moreroom	○○	\unitedpawns	⊙	\zugzwang

The preceding symbols are merely the named informator symbol. skak can typeset many more chess-related symbols, including those for all of the pieces (♔♕♖♗♘♙/♚♛♜♝♞♟), but only in the context of moves and boards, not as individual, named LaTeX symbols.

Table 220: metre Metrical Symbols

×	\a	⏒	\bBm	‖	\cc	⏖	\Mbb	⋮	\Pppp	⊗	\t
⏑́	\B	⏒	\bbm	‖‖	\Ccc	⏖	\mbbx	⋮	\pppp	⎵	\tsbm
⏑	\b	⏒́	\Bbm	‗	\m	∘∘	\oo	⋮	\Ppppp	⎵	\tsmb
⏑́⏑	\Bb	⏒⏒	\bbmb	‗́	\M	⋅	\p	⋮	\ppppp	⎵	\tsmm
⏑́⏑	\BB	⏒⏒	\bbmx	⏓	\ma	⋱	\pm	⎵⎵	\ps	⋱	\vppm
⏑⏑	\bb	⏒	\bm	⏒́	\Mb	:	\pp	:	\pxp	⋮	\vpppm
⏑⏑́	\bB	⏒́	\Bm	⏒	\mb	:	\Pp	:	\Pxp	::	\x
⏓⏓	\bba	|	\c	⏖́	\mBb	⋱	\ppm	∼	\R		
⏒⏒	\bbb	|	\C	⏖́	\mbB	⋮	\ppp	∼	\r		
⏒́	\BBm	‖	\Cc	⏖	\mbb	⋮	\Ppp	⊗	\T		

The preceding symbols are valid only within the argument to the `metre` command.

Table 221: metre Small and Large Metrical Symbols

÷	\anaclasis	÷	\Anaclasis
<	\antidiple	<	\Antidiple
≮	\antidiple*	≮	\Antidiple*
⊃	\antisigma	⊃	\Antisigma
※	\asteriscus	※	\Asteriscus
∧	\catalexis	∧	\Catalexis
>	\diple	>	\Diple
≯	\diple*	≯	\Diple*
—	\obelus	—	\Obelus
÷	\obelus*	÷	\Obelus*
∼	\respondens	∼	\Respondens
⊗	\terminus	⊗	\Terminus
⊕	\terminus*	⊕	\Terminus*

TABLE 222: phaistos Symbols from the Phaistos Disk

	\PHarrow		\PHeagle		\PHplumedHead
	\PHbee		\PHflute		\PHram
	\PHbeehive		\PHgaunlet		\PHrosette
	\PHboomerang		\PHgrater		\PHsaw
	\PHbow		\PHhelmet		\PHshield
	\PHbullLeg		\PHhide		\PHship
	\PHcaptive		\PHhorn		\PHsling
	\PHcarpentryPlane		\PHlid		\PHsmallAxe
	\PHcat		\PHlily		\PHstrainer
	\PHchild		\PHmanacles		\PHtattooedHead
	\PHclub		\PHmattock		\PHtiara
	\PHcolumn		\PHoxBack		\PHtunny
	\PHcomb		\PHpapyrus		\PHvine
	\PHdolium		\PHpedestrian		\PHwavyBand
	\PHdove		\PHplaneTree		\PHwoman

TABLE 223: protosem Proto-Semitic Characters

	\Aaleph		\AAhe		\Akaph		\Asamekh		\AAresh
	\AAaleph		\Azayin		\AAkaph		\Ape		\Ashin
	\Abeth		\Avav		\Alamed		\AApe		\Ahelmet
	\AAbeth		\Aheth		\AAlamed		\Asade		\AAhelmet
	\Agimel		\AAheth		\Amem		\AAsade		\Atav
	\Adaleth		\Ateth		\Anun		\Aqoph		
	\AAdaleth		\Ayod		\Aayin		\AAqoph		
	\Ahe		\AAyod		\AAayin		\Aresh		

The protosem package defines abbreviated control sequences for each of the above. In addition, single-letter shortcuts can be used within the argument to the `\textproto` command (e.g., "`\textproto{Pakyn}`" produces " "). See the protosem documentation for more information.

TABLE 224: hieroglf Hieroglyphics

	\HA		\HI		\Hn		\HT
	\Ha		\Hi		\HO		\Ht
	\HB		\Hibl		\Ho		\Htongue
	\Hb		\Hibp		\Hp		\HU
	\Hc		\Hibs		\HP		\Hu
	\HC		\Hibw		\Hplural		\HV
	\HD		\HJ		\Hplus		\Hv
	\Hd		\Hj		\HQ		\Hvbar
	\Hdual		\Hk		\Hq		\Hw
	\He		\HK		\Hquery		\HW
	\HE		\HL		\HR		\HX
	\Hf		\Hl		\Hr		\Hx
	\HF		\Hm		\Hs		\HY
	\HG		\HM		\HS		\Hy
	\Hg		\Hman		\Hscribe		\Hz
	\Hh		\Hms		\Hslash		\HZ
	\HH		\HN		\Hsv		
	\Hone		\Hhundred		\HXthousand		\Hmillion
	\Hten		\Hthousand		\HCthousand		

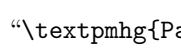
The hieroglf package defines alternate control sequences and single-letter shortcuts for each of the above which can be used within the argument to the `\textpmhg` command (e.g., "`\textpmhg{Pakin}`" produces "  "). See the hieroglf documentation for more information.

TABLE 225: dictsym Dictionary Symbols

	\dsaeronautical		\dscommercial		\dsmedical
	\dsagricultural		\dsheraldical		\dsmilitary
	\dsarchitectural		\dsjuridical		\dsrailways
	\dsbiological		\dsliterary		\dstechnical
	\dschemical		\dsmathematical		

7 Additional Information

Unlike the previous sections of this document, Section 7 does not contain new symbol tables. Rather, it provides additional help in using the Comprehensive LaTeX Symbol List. First, it draws attention to symbol names used by multiple packages. Next, it provides some guidelines for finding symbols and gives some examples regarding how to construct missing symbols out of existing ones. Then, it comments on the spacing surrounding symbols in math mode. After that, it presents an ASCII and Latin 1 quick-reference guide, showing how to enter all of the standard ASCII/Latin 1 symbols in LaTeX. And finally, it lists some statistics about this document itself.

7.1 Symbol Name Clashes

Unfortunately, a number of symbol names are not unique; they appear in more than one package. Depending on how the symbols are defined in each package, LaTeX will either output an error message or replace an earlier-defined symbol with a later-defined symbol. Table 226 presents a selection of name clashes that appear in this document.

Using multiple symbols with the same name in the same document—or even merely loading conflicting symbol packages—can be tricky, but, as evidenced by the existence of Table 226, not impossible. The general procedure is to load the first package, rename the conflicting symbols, and then load the second package. Examine the LaTeX source for this document (`symbols.tex`)—especially the `\savesymbol` and `\restoresymbol` macros and their subsequent usage—to see one possible way to handle symbol conflicts.

txfonts and pxfonts redefine a huge number of symbols—essentially, all of the symbols defined by latexsym, textcomp, the various $\mathcal{AMS}$ symbol sets, and LaTeX 2$_\varepsilon$ itself. Similarly, mathabx redefines a vast number of math symbols in an attempt to improve their look. The txfonts, pxfonts, and mathabx conflicts are not listed in Table 226 because they are designed to be compatible with the symbols they replace. Table 227 on page 66 illustrates what "compatible" means in this context.

To use the new txfonts/pxfonts symbols without altering the document's main font, merely reset the default font families back to their original values after loading one of those packages:

```
\renewcommand\rmdefault{cmr}
\renewcommand\sfdefault{cmss}
\renewcommand\ttdefault{cmtt}
```

7.2 Where can I find the symbol for ... ?

If you can't find some symbol you're looking for in this document, there are a few possible explanations:

- The symbol isn't intuitively named. As a few examples, the command to draw dice is "`\Cube`"; a plus sign with a circle around it ("exclusive or" to computer engineers) is "`\oplus`"; and lightning bolts in fonts designed by German speakers may have "blitz" in their names. The moral of the story is to be creative with synonyms when searching the index.
- The symbol is defined by some package that I overlooked (or deemed unimportant). If there's some symbol package that you think should be included in the Comprehensive LaTeX Symbol List, please send me e-mail at the address listed on the title page.
- The symbol isn't defined in any package whatsoever.

Even in the last case, all is not lost. Sometimes, a symbol exists in a font, but there is no LaTeX binding for it. For example, the PostScript Symbol font contains a "↵" symbol, which may be useful for representing a carriage return, but there is no package (as far as I know) for accessing that symbol. To produce an unnamed symbol, you need to switch to the font explicitly with LaTeX 2$_\varepsilon$'s low-level font commands [LaT00] and use TeX's primitive `\char` command [Knu86a] to request a specific character number in the font.[3] In fact, `\char` is not strictly necesssary; the character can often be entered symbolically. For example, the symbol for an impulse train or Tate-Shafarevich group ("Ш") is actually an uppercase *sha* in the Cyrillic alphabet. (Cyrillic is supported by the OT2 font encoding, for instance). While a *sha* can be defined numerically as "`{\fontencoding{OT2}\selectfont\char88}`" it may be more intuitive to use the OT2 font encoding's "SH" ligature: "`{\fontencoding{OT2}\selectfont SH}`".

[3] pifont defines a convenient `\Pisymbol` command for accessing symbols in PostScript fonts by number. For example, "`\Pisymbol{psy}{191}`" produces "↵".

Table 226: Symbol Name Clashes

Symbol	LaTeX 2ε	AMS	stmaryrd	wasysym	mathabx	marvosym	bbding	ifsym	dingbat	wsuipa
\baro			⌽							⊖
\bigtriangledown	▽		▽							
\bigtriangleup	△		△							
\checkmark		✓							✓	
\Circle				○				○		
\Cross						✝	✝	✕		
\ggg		⋙			⩾					
\Letter						✉		✉		
\lightning			↯	↯						
\Lightning						🗲		🗲		
\lll		⋘			⩽					
\Rightarrow	⇒				⇒	➔				
\Square				□			□	□		
\Sun					⊙	☉		☼		
\TriangleDown							▼	▽		
\TriangleUp							▲	△		

TABLE 227: Example of a Benign Name Clash

Symbol	Default (Computer Modern)	txfonts (Times Roman)
`R`	R	R
`\textrecipe`	℞	℞

Reflecting and rotating existing symbols

A common request on `comp.text.tex` is for a reversed or rotated version of an existing symbol. As a last resort, these effects can be achieved with the graphicx (or graphics) package's `\reflectbox` and `\rotatebox` macros. For example, `\rotatebox[origin=c]{180}{$\iota$}` produces the definite-description operator ("$\reflectbox{\rotatebox{180}{\iota}}$"). The disadvantage of the graphicx/graphics approach is that not every TEX backend handles graphical transformations.[4] Far better is to find a suitable font that contains the desired symbol in the correct orientation. For instance, if the phonetic package is available, then `\textit{\riota}` will yield a backend-independent "$\reflectbox{\rotatebox{180}{\iota}}$". Similarly, tipa's `\textrevepsilon` ("ɜ") or wsuipa's `\revepsilon` ("ɜ") may be used to express the mathematical notion of "such that" in a cleaner manner than with `\reflectbox` or `\rotatebox`.

Joining and overlapping existing symbols

Symbols that do not exist in any font can sometimes be fabricated out of existing symbols. The LATEX 2ε source file `fontdef.dtx` contains a number of such definitions. For example, `\models` (see Table 54 on page 25) is defined in that file with:

```
\def\models{\mathrel|\joinrel=}
```

where `\mathrel` and `\joinrel` are used to control the horizontal spacing. `\def` is the TEX primitive upon which LATEX's `\newcommand` is based. See The TEXbook [Knu86a] for more information on all three of those commands.

With some simple pattern-matching, one can easily define a backward `\models` sign ("=|"):

```
\def\ismodeledby{=\joinrel\mathrel|}
```

In general, arrows/harpoons, horizontal lines ("=", "-", "`\relbar`", and "`\Relbar`"), and the various math-extension characters can be combined creatively with miscellaneous other characters to produce a variety of new symbols. Of course, new symbols can be composed from *any* set of existing characters. For instance, LATEX defines `\hbar` ("$\hbar$") as a "$^-$" character (`\mathchar'26`) followed by a backspace of 9 math units (`\mkern-9mu`), followed by the letter "h":

```
\def\hbar{{\mathchar'26\mkern-9muh}}
```

We can just as easily define other barred letters:

```
\def\bbar{{\mathchar'26\mkern-9mu b}}
\def\dbar{{\mathchar'26\mkern-12mu d}}
```

(The space after the "mu" is optional but is added for clarity.) `\bbar` and `\dbar` define "$\bbar{b}$" and "$\dbar{d}$", respectively. Note that `\dbar` requires a greater backward math kern than `\bbar`; a −9 mu kern would have produced the less-attractive "$\bar{d}$" glyph.

There is a TEX primitive called `\mathaccent` which centers one mathematical symbol atop another. For example, one can define `\dotcup` ("$\dotcup$")—the composition of a `\cup` and a `\cdot`—as follows:

```
\newcommand{\dotcup}{\ensuremath{\mathaccent\cdot\cup}}
```

[4] As an example, Xdvi ignores both `\reflectbox` and `\rotatebox`.

The catch is that `\mathaccent` requires the accent to be a "math character". That is, it must be a character in a math font as opposed to a symbol defined in terms of other symbols. See The TEXbook [Knu86a] for more information.

Another TEX primitive that is useful for composing symbols is `\vcenter`. `\vcenter` is conceptually similar to "`\begin{tabular}{l}`" in LATEX but takes a list of vertical material instead of `\\`-separated rows. Also, it vertically centers the result on the math axis. (Many operators, such as "+" and "−" are also vertically centered on the math axis.) Enrico Gregorio posted the following symbol definition to `comp.text.tex` in March 2004 in response to a query about an alternate way to denote equivalence:

```
\newcommand*{\threesim}{%
  \mathrel{\vcenter{\offinterlineskip
  \hbox{$\sim$}\vskip-.35ex\hbox{$\sim$}\vskip-.35ex\hbox{$\sim$}}}}
```

The `\threesim` symbol, which vertically centers three `\sim` ("∼") symbols with 0.35 x-heights of space between them, is rendered as "≋". `\offinterlineskip` is a macro that disables implicit interline spacing. Without it, `\threesim` would have a full line of vertical spacing between each `\sim`. Because of `\vcenter`, `\threesim` aligns properly with other math operators: $a \div b \thickapprox c \times d$.

The slashed package, although originally designed for producing Feynman slashed-character notation, in fact facilitates the production of *arbitrary* overlapped symbols. The default behavior is to overwrite a given character with "/". For example, `\slashed{D}` produces "$\not{D}$". However, the `\declareslashed` command provides the flexibility to specify the mathematical context of the composite character (operator, relation, punctuation, etc., as will be discussed in Section 7.3), the overlapping symbol, horizontal and vertical adjustments in symbol-relative units, and the character to be overlapped. Consider, for example, the symbol for reduced quadrupole moment ("I"). This can be declared as follows:

```
\newcommand{\rqm}{{%
  \declareslashed{}{\text{-}}{0.04}{0}{I}\slashed{I}}}
```

`\declareslashed{·}{·}{·}{·}{I}` affects the meaning of all subsequent `\slashed{I}` commands in the same scope. The preceding definition of `\rqm` therefore uses an extra set of curly braces to limit that scope to a single `\slashed{I}`. In addition, `\rqm` uses amstext's `\text` macro (described on the next page) to make `\declareslashed` use a text-mode hyphen ("-") instead of a math-mode minus sign ("−") and to ensure that the hyphen scales properly in size in subscripts and superscripts. See slashed's documentation (located in `slashed.sty` itself) for a detailed usage description of the `\slashed` and `\declareslashed` commands.

Making new symbols work in superscripts and subscripts

To make composite symbols work properly within subscripts and superscripts, you may need to use TEX's `\mathchoice` primitive. `\mathchoice` evaluates one of four expressions, based on whether the current math style is display, text, script, or scriptscript. (See The TEXbook [Knu86a] for a more complete description.) For example, the following LATEX code—posted to `comp.text.tex` by Torsten Bronger—composes a sub/superscriptable "⊥" symbol out of `\top` and `\bot` ("⊤" and "⊥"):

```
\def\topbotatom#1{\hbox{\hbox to 0pt{$#1\bot$\hss}$#1\top$}}
\newcommand*{\topbot}{\mathrel{\mathchoice{\topbotatom\displaystyle}
                                  {\topbotatom\textstyle}
                                  {\topbotatom\scriptstyle}
                                  {\topbotatom\scriptscriptstyle}}}
```

The following is another example that uses `\mathchoice` to construct symbols in different math modes. The code defines a principal value integral symbol, which is an integral sign with a line through it.

```
\def\Xint#1{\mathchoice
   {\XXint\displaystyle\textstyle{#1}}%
   {\XXint\textstyle\scriptstyle{#1}}%
   {\XXint\scriptstyle\scriptscriptstyle{#1}}%
   {\XXint\scriptscriptstyle\scriptscriptstyle{#1}}%
   \!\int}
\def\XXint#1#2#3{{\setbox0=\hbox{$#1{#2#3}{\int}$}
```

```
      \vcenter{\hbox{$#2#3$}}\kern-.5\wd0}}
\def\ddashint{\Xint=}
\def\dashint{\Xint-}
```

(The preceding code was taken verbatim from the UK TEX Users' Group FAQ at `http://www.tex.ac.uk/faq`.) `\dashint` produces a single-dashed integral sign ("⨍"), while `\ddashint` produces a double-dashed one ("⨏"). The `\Xint` macro defined above can also be used to generate a wealth of new integrals: "∲" (`\Xint\circlearrowright`), "∳" (`\Xint\circlearrowleft`), "⨐" (`\Xint\subset`), "⨜" (`\Xint\infty`), and so forth.

LATEX 2_ε provides a simple wrapper for `\mathchoice` that sometimes helps produce terser symbol definitions. The macro is called `\mathpalette` and it takes two arguments. `\mathpalette` invokes the first argument, passing it one of "`\displaystyle`", "`\textstyle`", "`\scriptstyle`", or "`\scriptscriptstyle`", followed by the second argument. `\mathpalette` is useful when a symbol macro must know which math style is currently in use (e.g., to set it explicitly within an `\mbox`). Donald Arseneau posted the following `\mathpalette`-based definition of a probabilistic-independence symbol ("⫫") to `comp.text.tex` in June 2000:

```
\newcommand\independent{\protect\mathpalette{\protect\independenT}{\perp}}
\def\independenT#1#2{\mathrel{\rlap{$#1#2$}\mkern2mu{#1#2}}}
```

The `\independent` macro uses `\mathpalette` to pass the `\independenT` helper macro both the current math style and the `\perp` symbol. `\independenT` typesets `\perp` in the current math style, moves two math units to the right, and finally typesets a second—overlapping—copy of `\perp`, again in the current math style. `\rlap`, which enables text overlap, is described later on this page.

Some people like their square-root signs with a trailing "hook" (i.e., "$\sqrt{\ }$") as this helps visually distinguish expressions like "$\sqrt{3x}$" from those like "$\sqrt{3}x$". In March 2002, Dan Luecking posted a `\mathpalette`-based definition of a hooked square-root symbol to `comp.text.tex`:

```
\def\hksqrt{\mathpalette\DHLhksqrt}
\def\DHLhksqrt#1#2{\setbox0=\hbox{$#1\sqrt{#2\,}$}\dimen0=\ht0
  \advance\dimen0-0.2\ht0
  \setbox2=\hbox{\vrule height\ht0 depth -\dimen0}%
  {\box0\lower0.4pt\box2}}
```

Notice how `\DHLhksqrt` uses `\mathpalette` to recover the outer math style (argument `#1`) from within an `\hbox`. The rest of the code is simply using TEX primitives to position a hook of height 0.2 times the `\sqrt` height at the right of the `\sqrt`. See The TEXbook [Knu86a] for more understanding of TEX "boxes" and "dimens".

Sometimes, however, amstext's `\text` macro is all that is necessary to make composite symbols appear correctly in subscripts and superscripts, as in the following definitions of `\neswarrow` ("⤢") and `\nwsearrow` ("⤡"):[5]

```
\newcommand{\neswarrow}{\mathrel{\text{$\nearrow$\llap{$\swarrow$}}}}
\newcommand{\nwsearrow}{\mathrel{\text{$\nwarrow$\llap{$\searrow$}}}}
```

`\text` resembles LATEX's `\mbox` command but shrinks its argument appropriately when used within a subscript or superscript. `\llap` ("left overlap") and its counterpart, `\rlap` ("right overlap"), appear frequently when creating composite characters. `\llap` outputs its argument to the left of the current position, overlapping whatever text is already there. Similarly, `\rlap` overlaps whatever text would normally appear to the right of its argument. For example, "`A\llap{B}`" and "`\rlap{A}B`" each produce "AB". However, the result of the former is the width of "A", and the result of the latter is the width of "B"—`\llap{...}` and `\rlap{...}` take up zero space.

In a June 2002 post to `comp.text.tex`, Donald Arseneau presented a general macro for aligning an arbitrary number of symbols on their horizontal centers and vertical baselines:

```
\makeatletter
  \def\moverlay{\mathpalette\mov@rlay}
  \def\mov@rlay#1#2{\leavevmode\vtop{%
     \baselineskip\z@skip \lineskiplimit-\maxdimen
     \ialign{\hfil$#1##$\hfil\cr#2\crcr}}}
\makeatother
```

[5] Note that if your goal is to typeset commutative diagrams, then you should probably be using XY-pic.

The `\makeatletter` and `\makeatother` commands are needed to coerce LaTeX into accepting "`@`" as part of a macro name. `\moverlay` takes a list of symbols separated by `\cr` (TeX's equivalent of LaTeX's `\\`). For example, the `\topbot` command defined on page 67 could have been expressed as "`\moverlay{\top\cr\bot}`" and the `\neswarrow` command defined on the previous page could have been expressed as "`\moverlay{\nearrow\cr\swarrow}`".

The basic concept behind `\moverlay`'s implementation is that `\moverlay` typesets the given symbols in a table that utilizes a zero `\baselineskip`. This causes every row to be typeset at the same vertical position. See The TeXbook [Knu86a] for explanations of the TeX primitives used by `\moverlay`.

Modifying LaTeX-generated symbols

Oftentimes, symbols composed in the LaTeX 2_ε source code can be modified with minimal effort to produce useful variations. For example, `fontdef.dtx` composes the `\ddots` symbol (see Table 138 on page 43) out of three periods, raised 7 pt., 4 pt., and 1 pt., respectively:

```
\def\ddots{\mathinner{\mkern1mu\raise7\p@
    \vbox{\kern7\p@\hbox{.}}\mkern2mu
    \raise4\p@\hbox{.}\mkern2mu\raise\p@\hbox{.}\mkern1mu}}
```

`\p@` is a LaTeX 2_ε shortcut for "`pt`" or "`1.0pt`". The remaining commands are defined in The TeXbook [Knu86a]. To draw a version of `\ddots` with the dots going along the opposite diagonal, we merely have to reorder the `\raise7\p@`, `\raise4\p@`, and `\raise\p@`:

```
\makeatletter
  \def\revddots{\mathinner{\mkern1mu\raise\p@
    \vbox{\kern7\p@\hbox{.}}\mkern2mu
    \raise4\p@\hbox{.}\mkern2mu\raise7\p@\hbox{.}\mkern1mu}}
\makeatother
```

`\revddots` is essentially identical to the mathdots package's `\iddots` command or the yhmath package's `\adots` command.

Producing complex accents

Accents are a special case of combining existing symbols to make new symbols. While various tables in this document show how to add an accent to an existing symbol, some applications, such as transliterations from non-Latin alphabets, require *multiple* accents per character. For instance, the creator of pdfTeX writes his name as "Hàn Thế Thành". The dblaccnt package enables LaTeX to stack accents, as in "`H\‘an Th\’{\^e} Th\‘anh`" (albeit not in the OT1 font encoding). In addition, the wsuipa package defines `\diatop` and `\diaunder` macros for putting one or more diacritics or accents above or below a given character. For example, `\diaunder[{\diatop[\’|\=]}|\textsubdot{r}]` produces "$\underset{\cdot}{\acute{\bar{\text{r}}}}$". See the wsuipa documentation for more information.

The accents package facilitates the fabrication of accents in math mode. Its `\accentset` command enables *any* character to be used as an accent. For instance, `\accentset{\star}{f}` produces "$\overset{\star}{f}$" and `\accentset{e}{X}` produces "$\overset{e}{X}$". `\underaccent` does the same thing, but places the accent beneath the character. This enables constructs like `\underaccent{\tilde}{V}`, which produces "$\underset{\sim}{V}$". accents provides other accent-related features as well; see the documentation for more information.

A more complex example of composing accents is the following definition of extensible `\overbracket`, `\underbracket`, `\overparenthesis`, and `\underparenthesis` symbols, taken from a May 2002 `comp.text.tex` post by Donald Arseneau (June 2003):

```
\makeatletter
\def\overbracket#1{\mathop{\vbox{\ialign{##\crcr\noalign{\kern3\p@}
      \downbracketfill\crcr\noalign{\kern3\p@\nointerlineskip}
      $\hfil\displaystyle{#1}\hfil$\crcr}}}\limits}
\def\underbracket#1{\mathop{\vtop{\ialign{##\crcr
      $\hfil\displaystyle{#1}\hfil$\crcr\noalign{\kern3\p@\nointerlineskip}
      \upbracketfill\crcr\noalign{\kern3\p@}}}}\limits}
```

```
\def\overparenthesis#1{\mathop{\vbox{\ialign{##\crcr\noalign{\kern3\p@}
      \downparenthfill\crcr\noalign{\kern3\p@\nointerlineskip}
      $\hfil\displaystyle{#1}\hfil$\crcr}}}\limits}
\def\underparenthesis#1{\mathop{\vtop{\ialign{##\crcr
      $\hfil\displaystyle{#1}\hfil$\crcr\noalign{\kern3\p@\nointerlineskip}
      \upparenthfill\crcr\noalign{\kern3\p@}}}}\limits}
\def\downparenthfill{$\m@th\braceld\leaders\vrule\hfill\bracerd$}
\def\upparenthfill{$\m@th\bracelu\leaders\vrule\hfill\braceru$}
\def\upbracketfill{$\m@th\makesm@sh{\llap{\vrule\@height3\p@\@width.7\p@}}%
  \leaders\vrule\@height.7\p@\hfill
  \makesm@sh{\rlap{\vrule\@height3\p@\@width.7\p@}}$}
\def\downbracketfill{$\m@th
  \makesm@sh{\llap{\vrule\@height.7\p@\@depth2.3\p@\@width.7\p@}}%
  \leaders\vrule\@height.7\p@\hfill
  \makesm@sh{\rlap{\vrule\@height.7\p@\@depth2.3\p@\@width.7\p@}}$}
\makeatother
```

Table 228 showcases these accents. The TEXbook [Knu86a] or another book on TEX primitives is indispensible for understanding how the preceding code works. The basic idea is that `\downparenthfill`, `\upparenthfill`, `\downbracketfill`, and `\upbracketfill` do all of the work; they output a left symbol (e.g., `\braceld` [“⎧”] for `\downparenthfill`), a horizontal rule that stretches as wide as possible, and a right symbol (e.g., `\bracerd` [“⎫”] for `\downparenthfill`). `\overbracket`, `\underbracket`, `\overparenthesis`, and `\underparenthesis` merely create a table whose width is determined by the given text, thereby constraining the width of the horizontal rules.

Table 228: Manually Composed Extensible Accents

$\overbracket{abc}$	`\overbracket{abc}`	$\overparenthesis{abc}$	`\overparenthesis{abc}`
$\underbracket{abc}$	`\underbracket{abc}`	$\underparenthesis{abc}$	`\underparenthesis{abc}`

A similar, but simpler example, stems from another `comp.text.tex` post by Donald Arseneau. The following code defines an equals sign that extends as far to the right as possible (just like LATEX’s `\hrulefill` command):

```
\makeatletter
\def\equalsfill{$\m@th\mathord=\mkern-7mu
  \cleaders\hbox{$\!\mathord=\!$}\hfill
  \mkern-7mu\mathord=$}
\makeatother
```

TEX’s `\cleaders` and `\hfill` primitives are the key to understanding `\equalsfill`’s extensibility. Essentially, `\equalsfill` repeats a box containing “=” plus some negative space until it fills the maximum available horizontal space. `\equalsfill` is intended to be used with LATEX’s `\stackrel` command, which stacks one mathematical expression (slightly reduced in size) atop another. Hence, “`\stackrel{a}{\rightarrow}`” produces “$\stackrel{a}{\rightarrow}$” and “X `\stackrel{\text{definition}}{\hbox{\equalsfill}}` Y” produces “$X \stackrel{\text{definition}}{=\!=\!=\!=\!=\!=\!=} Y$”.

If all that needs to extend are horizontal and vertical lines—as opposed to repeated symbols such as the “=” in the previous example—LATEX’s `array` or `tabular` environments may suffice. Consider the following code (also presented in a `comp.text.tex` post by Donald Arseneau) for typesetting annuities:

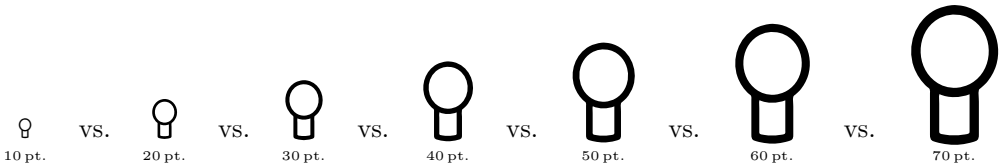
```
\DeclareRobustCommand{\annu}[1]{_{%
 \def\arraystretch{0}%
 \setlength\arraycolsep{1pt}%        adjust these
 \setlength\arrayrulewidth{.2pt}%  two settings
 \begin{array}[b]{@{}c|}\hline
 \\[\arraycolsep]%
 \scriptstyle #1%
 \end{array}%
}}
```

One can then use, e.g., "`$A\annu{x:n}$`" to produce "$A_{\overline{x:n}|}$".

Creating new symbols from scratch

Sometimes is it simply not possible to define a new symbol in terms of existing symbols. Fortunately, most, if not all, TEX distributions are shipped with a tool called METAFONT which is designed specifically for creating fonts to be used with TEX. The METAFONTbook [Knu86b] is the authoritative text on METAFONT. If you plan to design your own symbols with METAFONT, The METAFONTbook is essential reading. Nevertheless, the following is an extremely brief tutorial on how to create a new LATEX symbol using METAFONT. Its primary purpose is to cover the LATEX-specific operations not mentioned in The METAFONTbook and to demonstrate that symbol-font creation is not necessarily a difficult task.

Suppose we need a symbol to represent a light bulb ("💡").[6] The first step is to draw this in METAFONT. It is common to separate the font into two files: a size-dependent file, which specifies the design size and various font-specific parameters that are a function of the design size; and a size-independent file, which draws characters in the given size. Figure 1 shows the METAFONT code for `lightbulb10.mf`. `lightbulb10.mf` specifies various parameters that produce a 10 pt. light bulb then loads `lightbulb.mf`. Ideally, one should produce `lightbulb`⟨*size*⟩`.mf` files for a variety of ⟨*size*⟩s. This is called "optical scaling". It enables, for example, the lines that make up the light bulb to retain the same thickness at different font sizes, which looks much nicer than the alternative—and default—"mechanical scaling". When a `lightbulb`⟨*size*⟩`.mf` file does not exist for a given size ⟨*size*⟩, the computer mechanically produces a wider, taller, thicker symbol:




```
font_identifier := "LightBulb10";                    % Name the font.
font_size 10pt#;                                     % Specify the design size.

em# := 10pt#;                                        % "M" width is 10 points.
cap# := 7pt#;                                        % Capital letter height is 7 points above the baseline.
sb# := 1/4pt#;                                       % Leave this much space on the side of each character.
o# := 1/16pt#;                                       % Amount that curves overshoot borders.

input lightbulb                                      % Load the file that draws the actual glyph.
```

Figure 1: Sample METAFONT size-specific file (`lightbulb10.mf`)

`lightbulb.mf`, shown in Figure 2, draws a light bulb using the parameters defined in `lightbulb10.mf`. Note that the the filenames "`lightbulb10.mf`" and "`lightbulb.mf`" do not follow the Berry font-naming scheme [Ber01]; the Berry font-naming scheme is largely irrelevant for symbol fonts, which generally lack bold, italic, small-caps, slanted, and other such variants.

The code in Figures 1 and 2 is heavily commented and should demonstrate some of the basic concepts behind METAFONT usage: declaring variables, defining points, drawing lines and curves, and preparing to debug or fine-tune the output. Again, The METAFONTbook [Knu86b] is the definitive reference on METAFONT programming.

METAFONT can produce "proofs" of fonts—large, labeled versions that showcase the logical structure of each character. In fact, proof mode is METAFONT's default mode. To produce a proof of `lightbulb10.mf`, issue the following commands at the operating-system prompt:

```
prompt> mf lightbulb10.mf                  ⇐ Produces lightbulb10.2602gf
prompt> gftodvi lightbulb10.2602gf         ⇐ Produces lightbulb10.dvi
```

You can then view `lightbulb10.dvi` with any DVI viewer. The result is shown in Figure 3. Observe how the grid defined with *makegrid* at the bottom of Figure 2 draws vertical lines at positions 0, *sb*, $w/2$, and $w - sb$ and horizontal lines at positions 0, $-1pt$, y_2, and h. Similarly, observe how the *penlabels* command labels all of the important coordinates: $z_1, z_2, \ldots, z_8$ and z_{67}, which `lightbulb.mf` defines to lie between z_6 and z_7.

[6] I'm not a very good artist; you'll have to pretend that "💡" looks like a light bulb.

```
mode_setup;                                          % Target a given printer.

define_pixels(em, cap, sb);                          % Convert to device-specific units.
define_corrected_pixels(o);                          % Same, but add a device-specific fudge factor.

%% Define a light bulb at the character position for "A"
%% with width 1/2em#, height cap#, and depth 1pt#.
beginchar("A", 1/2em#, cap#, 1pt#); "A light bulb";
    pickup pencircle scaled 1/2pt;                   % Use a pen with a small, circular tip.

    %% Define the points we need.
    top z1 = (w/2, h + o);                           % z1 is at the top of a circle.
    rt z2 = (w + sb + o - x4, y4);                   % z2 is at the same height as z4 but the opposite side.
    bot z3 = (z1 - (0, w - sb - o));                 % z3 is at the bottom of the circle.
    lft z4 = (sb - o, 1/2[y1, y3]);                  % z4 is on the left of the circle.
    path bulb;                                       % Define a path for the bulb itself.
    bulb = z1 .. z2 .. z3 .. z4 .. cycle;            % The bulb is a closed path.

    z5 = point 2 - 1/3 of bulb;                      % z5 lies on the bulb, a little to the right of z3.
    z6 = (x5, 0);                                    % z6 is at the bottom, directly under z5.
    z7 = (x8, 0);                                    % z7 is at the bottom, directly under z8.
    z8 = point 2 + 1/3 of bulb;                      % z8 lies on the bulb, a little to the left of z3.
    bot z67 = (1/2[x6, x7], pen_bot - o - 1/8pt); % z67 lies halfway between z6 and z7 but a jot lower.

    %% Draw the bulb and the base.
    draw bulb;                                       % Draw the bulb proper.
    draw z5 -- z6 .. z67 .. z7 -- z8;                % Draw the base of the bulb.

    %% Display key positions and points to help us debug.
    makegrid(0, sb, w/2, w - sb)(0, -1pt, y2, h);    % Label "interesting" x and y coordinates.
    penlabels(1, 2, 3, 4, 5, 6, 67, 7, 8);           % Label control points for debugging.
endchar;
end
```

Figure 2: Sample METAFONT size-independent file (`lightbulb.mf`)

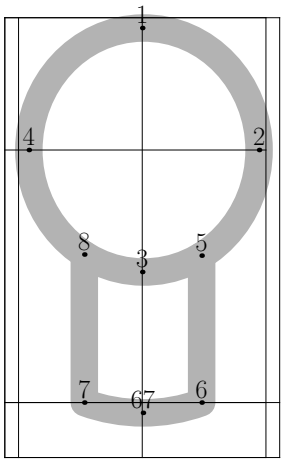


Figure 3: Proof diagram of `lightbulb10.mf`

Most, if not all, TEX distributions include a Plain TEX file called `testfont.tex` which is useful for testing new fonts in a variety of ways. One useful routine produces a table of all of the characters in the font:

```
prompt> tex testfont
This is TeX, Version 3.14159 (Web2C 7.3.1)
(/usr/share/texmf/tex/plain/base/testfont.tex
Name of the font to test = lightbulb10
Now type a test command (\help for help):)
*\table

*\bye
[1]
Output written on testfont.dvi (1 page, 1516 bytes).
Transcript written on testfont.log.
```

The resulting table, stored in `testfont.dvi` and illustrated in Figure 4, shows every character in the font. To understand how to read the table, note that the character code for "A"—the only character defined by `lightbulb10.mf`—is 41 in hexadecimal (base 16) and 101 in octal (base 8).

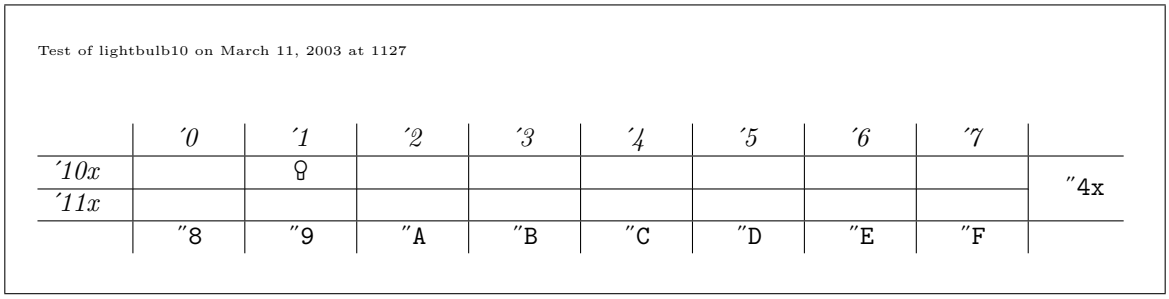


Figure 4: Font table produced by `testfont.tex`

The LightBulb10 font is now usable by TEX. LATEX 2ε, however, needs more information before documents can use the font. First, we create a font-description file that tells LATEX 2ε how to map fonts in a given font family and encoding to a particular font in a particular font size. For symbol fonts, this mapping is fairly simple. Symbol fonts almost always use the "U" ("Unknown") font encoding and frequently occur in only one variant: normal weight and non-italicized. The filename for a font-description file important; it must be of the form "⟨*encoding*⟩⟨*family*⟩`.fd`", where ⟨*encoding*⟩ is the lowercase version of the encoding name (typically "u" for symbol fonts) and ⟨*family*⟩ is the name of the font family. For LightBulb10, let's call this "bulb". Figure 5 lists the contents of `ubulb.fd`. The document "LATEX 2ε Font Selection" [LAT00] describes `\DeclareFontFamily` and `\DeclareFontShape` in detail, but the gist of `ubulb.fd` is first to declare a `U`-encoded version of the `bulb` font family and then to specify that a LATEX 2ε request for a `U`-encoded version of `bulb` with a (`m`)edium font series (as opposed to, e.g., bold) and a (`n`)ormal font shape (as opposed to, e.g., italic) should translate into a TEX request for `lightbulb10.tfm` mechanically scaled to the current font size.

```
\DeclareFontFamily{U}{bulb}{}
\DeclareFontShape{U}{bulb}{m}{n}{<-> lightbulb10}{}
```

Figure 5: LATEX 2ε font-description file (`ubulb.fd`)

The final step is to write a LATEX 2ε style file that defines a name for each symbol in the font. Because we have only one symbol our style file, `lightbulb.sty` (Figure 6), is rather trivial. Note that instead of typesetting "`A`" we could have had `\lightbulb` typeset "`\char65`", "`\char"41`", or "`\char'101`" (respectively, decimal, hexadecimal, and octal character offsets into the font). For a simple, one-character symbol font such as LightBulb10 it would be reasonable to merge `ubulb.fd` into `lightbulb.sty` instead of maintaining two separate files. In either case, a document need only include "`\usepackage{lightbulb}`" to make the `\lightbulb` symbol available.

METAFONT normally produces bitmapped fonts. However, it is also possible, with the help of some external tools, to produce PostScript Type 1 fonts. These have the advantages of rendering better in Adobe®

```
\newcommand{\lightbulb}{{\usefont{U}{bulb}{m}{n}A}}
```

Figure 6: LaTeX 2_ε style file (`lightbulb.sty`)

Acrobat® (at least in versions prior to 6.0) and of being more memory-efficient when handled by a PostScript interpreter. See `http://www.tex.ac.uk/cgi-bin/texfaq2html?label=textrace` for pointers to tools that can produce Type 1 fonts from METAFONT.

7.3 Math-mode spacing

Terms such as "binary operators", "relations", and "punctuation" in Section 3 primarily regard the surrounding spacing. (See the Short Math Guide for LaTeX [Dow00] for a nice exposition on the subject.) To use a symbol for a different purpose, you can use the TeX commands `\mathord`, `\mathop`, `\mathbin`, `\mathrel`, `\mathopen`, `\mathclose`, and `\mathpunct`. For example, if you want to use `\downarrow` as a variable (an "ordinary" symbol) instead of a delimiter, you can write "`$3 x + \mathord{\downarrow}$`" to get the properly spaced "$3x + \downarrow$" rather than the awkward-looking "$3x+ \downarrow$". Similarly, to create a dotted-union symbol ("$\dot\cup$") that spaces like the ordinary set-union symbol (`\cup`) it must be defined with `\mathbin`, just as `\cup` is. Contrast "`$A \dot{\cup} B$`" ("$A\dot\cup B$") with "`$A \mathbin{\dot{\cup}} B$`" ("$A\dot\cup B$"). See The TeXbook [Knu86a] for the definitive description of math-mode spacing.

The purpose of the "log-like symbols" in Tables 96 and 97 is to provide the correct amount of spacing around and within multiletter function names. Table 229 contrasts the output of the log-like symbols with various, naïve alternatives. In addition to spacing, the log-like symbols also handle subscripts properly. For example, "`\max_{p \in P}`" produces "$\max_{p\in P}$" in text, but "$\max\limits_{p\in P}$" as part of a displayed formula.

Table 229: Spacing Around/Within Log-like Symbols

LaTeX expression	Output	
`$r \sin \theta$`	$r \sin \theta$	(best)
`$r sin \theta$`	$rsin\theta$	
`$r \mbox{sin} \theta$`	$r\mathrm{sin}\theta$	
`$r \mathrm{sin} \theta$`	$r\mathrm{sin}\theta$	

The amsmath package makes it straightforward to define new log-like symbols:

```
\DeclareMathOperator{\atan}{atan}
\DeclareMathOperator*{\lcm}{lcm}
```

The difference between `\DeclareMathOperator` and `\DeclareMathOperator*` involves the handling of subscripts. With `\DeclareMathOperator*`, subscripts are written beneath log-like symbols in display style and to the right in text style. This is useful for limit operators (e.g., `\lim`) and functions that tend to map over a set (e.g., `\min`). In contrast, `\DeclareMathOperator` tells TeX that subscripts should always be displayed to the right of the operator, as is common for functions that take a single parameter (e.g., `\log` and `\cos`). Table 230 contrasts symbols declared with `\DeclareMathOperator` and `\DeclareMathOperator*` in both text style (`$...$`) and display style (`\[...\]`).[7]

Table 230: Defining new log-like symbols

Declaration function	`$\newlogsym_{p \in P}$`	`\[ \newlogsym_{p \in P} \]`
`\DeclareMathOperator`	$\mathrm{newlogsym}_{p\in P}$	$\mathrm{newlogsym}_{p\in P}$
`\DeclareMathOperator*`	$\mathrm{newlogsym}_{p\in P}$	$\mathrm{newlogsym}\limits_{p\in P}$

[7] Note that `\displaystyle` can be used to force display style within `$...$` and `\textstyle` can be used to force text style within `\[...\]`.

It is common to use a thin space (`\,`) between the words of a multiword operators, as in "`\DeclareMathOperator*{\argmax}{arg\,max}`". `\liminf`, `\limsup`, and all of the log-like symbols shown in Table 97 utilize this spacing convention.

7.4 Bold mathematical symbols

LaTeX does not normally use bold symbols when typesetting mathematics. However, bold symbols are occasionally needed, for example when naming vectors. Any of the approaches described at `http://www.tex.ac.uk/cgi-bin/texfaq2html?label=boldgreek` can be used to produce bold mathematical symbols. Table 231 contrasts the output produced by these various techniques. As the table illustrates, these techniques exhibit variation in their formatting of Latin letters (upright vs. italic), formatting of Greek letters (bold vs. normal), formatting of operators and relations (bold vs. normal), and spacing.

Table 231: Producing bold mathematical symbols

Package	Code	Output	
none	`$\alpha + b = \Gamma \div D$`	$\alpha + b = \Gamma \div D$	(no bold)
none	`$\mathbf{\alpha + b = \Gamma \div D}$`	$\alpha + \mathbf{b} = \mathbf{\Gamma \div D}$	
none	`\boldmath$\alpha + b = \Gamma \div D$`	$\boldsymbol{\alpha + b = \Gamma \div D}$	
amsbsy	`$\pmb{\alpha + b = \Gamma \div D}$`	$\boldsymbol{\alpha + b = \Gamma \div D}$	(faked bold)
amsbsy	`$\boldsymbol{\alpha + b = \Gamma \div D}$`	$\boldsymbol{\alpha + b = \Gamma \div D}$	
bm	`$\bm{\alpha + b = \Gamma \div D}$`	$\boldsymbol{\alpha + b = \Gamma \div D}$	
fixmath	`$\mathbold{\alpha + b = \Gamma \div D}$`	$\boldsymbol{\alpha + b = \Gamma \div D}$	

7.5 ASCII and Latin 1 quick reference

Table 232 on the next page amalgamates data from various other tables in this document into a convenient reference for LaTeX 2$_\varepsilon$ typesetting of ASCII characters, i.e., the characters available on a typical U.S. computer keyboard. The first two columns list the character's ASCII code in decimal and hexadecimal. The third column shows what the character looks like. The fourth column lists the LaTeX 2$_\varepsilon$ command to typeset the character as a text character. And the fourth column lists the LaTeX 2$_\varepsilon$ command to typeset the character within a `\texttt{...}` command (or, more generally, when `\ttfamily` is in effect).

The following are some additional notes about the contents of Table 232:

- "`"`" is not available in the OT1 font encoding.
- The characters "`<`", "`>`", and "`|`" do work as expected in math mode, although they produce, respectively, "¡", "¿", and "—" in text mode when using the OT1 font encoding.[8] The following are some alternatives for typesetting "<", ">", and "|":
  - Specify a document font encoding other than OT1 (as described on page 6).
  - Use the appropriate symbol commands from Table 2 on page 7, viz. `\textless`, `\textgreater`, and `\textbar`.
  - Enter the symbols in math mode instead of text mode, i.e., `$<$`, `$>$`, and `$|$`.

  Note that for typesetting metavariables many people prefer `\textlangle` and `\textrangle` to `\textless` and `\textgreater`, i.e., "⟨*filename*⟩" instead of "<*filename*>".
- Although "`/`" does not require any special treatment, LaTeX additionally defines a `\slash` command which outputs the same glyph but permits a line break afterwards. That is, "`increase/decrease`" is always typeset as a single entity while "`increase\slash{}decrease`" may be typeset with "increase/" on one line and "decrease" on the next.

[8] Donald Knuth didn't think such symbols were important outside of mathematics so he omitted them from his text fonts.

TABLE 232: LaTeX 2_ε ASCII Table

Dec	Hex	Char	Body text	\texttt
33	21	!	!	!
34	22	"	\textquotedbl	"
35	23	#	\#	\#
36	24	$	\$	\$
37	25	%	\%	\%
38	26	&	\&	\&
39	27	’	’	’
40	28	(	(	(
41	29	)	)	)
42	2A	*	*	*
43	2B	+	+	+
44	2C	,	,	,
45	2D	-	-	-
46	2E	.	.	.
47	2F	/	/	/
48	30	0	0	0
49	31	1	1	1
50	32	2	2	2
⋮	⋮	⋮	⋮	⋮
57	39	9	9	9
58	3A	:	:	:
59	3B	;	;	;
60	3C	<	\textless	<
61	3D	=	=	=
62	3E	>	\textgreater	>
63	3F	?	?	?
64	40	@	@	@
65	41	A	A	A
66	42	B	B	B
67	43	C	C	C
⋮	⋮	⋮	⋮	⋮
90	5A	Z	Z	Z
91	5B	[	[	[
92	5C	\	\textbackslash	\char‘\\
93	5D	]	]	]
94	5E	^	\^{}	\^{}
95	5F	_	_	\char‘_
96	60	‘	‘	‘
97	61	a	a	a
98	62	b	b	b
99	63	c	c	c
⋮	⋮	⋮	⋮	⋮
122	7A	z	z	z
123	7B	{	\{	\char‘\{
124	7C	|	\textbar	|
125	7D	}	\}	\char‘\}
126	7E	~	\~{}	\~{}

- `\textasciicircum` can be used instead of `\^{}`, and `\textasciitilde` can be used instead of `\~{}`. Note that `\textasciitilde` and `\~{}` produce raised, diacritic tildes. “Text” (i.e., vertically centered) tildes can be generated with either the math-mode `\sim` command (shown in Table 54 on page 25), which produces a somewhat wide “∼”, or the textcomp package’s `\texttildelow` (shown in Table 36 on page 18), which produces a vertically centered “~” in most fonts but a baseline-oriented “˜” in Computer Modern, txfonts, pxfonts, and various other fonts originating from the TEX world. If your goal is to typeset tildes in URLs or Unix filenames, your best bet is to use the url package, which has a number of nice features such as proper line-breaking of such names.

- The various `\char` commands within `\texttt` are necessary only in the OT1 font encoding. In other encodings (e.g., T1), commands such as `\{`, `\}`, `\_`, and `\textbackslash` all work properly.

- The IBM version of ASCII characters 1 to 31 can be typeset using the ascii package. See Table 166 on page 49.

- To replace “‘” and “’” with the more computer-like (and more visibly distinct) “`” and “'” within a `verbatim` environment, use the upquote package. Outside of `verbatim`, you can use `\char18` and `\char13` to get the modified quote characters. (The former is actually a grave accent.)

Similar to Table 232, Table 233 on the next page is an amalgamation of data from other tables in this document. While Table 232 shows how to typeset the 7-bit ASCII character set, Table 233 shows the Latin 1 (Western European) character set, also known as ISO-8859-1.

The following are some additional notes about the contents of Table 233:

- A “(tc)” after a symbol name means that the textcomp package must be loaded to access that symbol. A “(T1)” means that the symbol requires the T1 font encoding. The fontenc package can change the font encoding document-wide.

TABLE 233: LaTeX 2_ε Latin 1 Table

Dec	Hex	Char	LaTeX 2_ε	
161	A1	¡	!‘	
162	A2	¢	\textcent	(tc)
163	A3	£	\pounds	
164	A4	¤	\textcurrency	(tc)
165	A5	¥	\textyen	(tc)
166	A6	¦	\textbrokenbar	(tc)
167	A7	§	\S	
168	A8	¨	\textasciidieresis	(tc)
169	A9	©	\textcopyright	
170	AA	ª	\textordfeminine	
171	AB	«	\guillemotleft	(T1)
172	AC	¬	\textlnot	(tc)
173	AD	-	\-	
174	AE	®	\textregistered	
175	AF	¯	\textasciimacron	(tc)
176	B0	°	\textdegree	(tc)
177	B1	±	\textpm	(tc)
178	B2	²	\texttwosuperior	(tc)
179	B3	³	\textthreesuperior	(tc)
180	B4	´	\textasciiacute	(tc)
181	B5	µ	\textmu	(tc)
182	B6	¶	\P	
183	B7	·	\textperiodcentered	
184	B8	¸	\c{}	
185	B9	¹	\textonesuperior	(tc)
186	BA	º	\textordmasculine	
187	BB	»	\guillemotright	
188	BC	¼	\textonequarter	(tc)
189	BD	½	\textonehalf	(tc)
190	BE	¾	\textthreequarters	(tc)
191	BF	¿	?‘	
192	C0	À	\‘{A}	
193	C1	Á	\’{A}	
194	C2	Â	\^{A}	
195	C3	Ã	\~{A}	
196	C4	Ä	\"{A}	
197	C5	Å	\AA	
198	C6	Æ	\AE	
199	C7	Ç	\c{C}	
200	C8	È	\‘{E}	
201	C9	É	\’{E}	
202	CA	Ê	\^{E}	
203	CB	Ë	\"{E}	
204	CC	Ì	\‘{I}	
205	CD	Í	\’{I}	
206	CE	Î	\^{I}	
207	CF	Ï	\"{I}	
208	D0	Đ	\DH	(T1)

Dec	Hex	Char	LaTeX 2_ε	
209	D1	Ñ	\~{N}	
210	D2	Ò	\‘{O}	
211	D3	Ó	\’{O}	
212	D4	Ô	\^{O}	
213	D5	Õ	\~{O}	
214	D6	Ö	\"{O}	
215	D7	×	\texttimes	(tc)
216	D8	Ø	\O	
217	D9	Ù	\‘{U}	
218	DA	Ú	\’{U}	
219	DB	Û	\^{U}	
220	DC	Ü	\"{U}	
221	DD	Ý	\’{Y}	
222	DE	Þ	\TH	(T1)
223	DF	ß	\ss	
224	E0	à	\‘{a}	
225	E1	á	\’{a}	
226	E2	â	\^{a}	
227	E3	ã	\~{a}	
228	E4	ä	\"{a}	
229	E5	å	\aa	
230	E6	æ	\ae	
231	E7	ç	\c{c}	
232	E8	è	\‘{e}	
233	E9	é	\’{e}	
234	EA	ê	\^{e}	
235	EB	ë	\"{e}	
236	EC	ì	\‘{ı}	
237	ED	í	\’{ı}	
238	EE	î	\^{ı}	
239	EF	ï	\"{ı}	
240	F0	ð	\dh	(T1)
241	F1	ñ	\~{n}	
242	F2	ò	\‘{o}	
243	F3	ó	\’{o}	
244	F4	ô	\^{o}	
245	F5	õ	\~{o}	
246	F6	ö	\"{o}	
247	F7	÷	\textdiv	(tc)
248	F8	ø	\o	
249	F9	ù	\‘{u}	
250	FA	ú	\’{u}	
251	FB	û	\^{u}	
252	FC	ü	\"{u}	
253	FD	ý	\’{y}	
254	FE	þ	\th	(T1)
255	FF	ÿ	\"{y}	

- Many of the `\text...` accents can also be produced using the accent commands shown in Table 18 on page 12 plus an empty argument. For instance, `\={}` is essentially the same as `\textasciimacron`.
- The commands in the "LaTeX 2ε" columns work both in body text and within a `\texttt{...}` command (or, more generally, when `\ttfamily` is in effect).
- Microsoft® Windows® normally uses a superset of Latin 1 called "CP1252" (Code Page 1252). CP1252 adds codes in the range 128–159 (hexadecimal 80–9F), including characters such as dashes, daggers, and quotation marks. If there's sufficient interest, a future version of the Comprehensive LaTeX Symbol List may include a CP1252 table.
- The "£" and "$" glyphs occupy the same slot (36) of the OT1 font encoding, with "£" appearing in italic fonts and "$" appearing in roman fonts. A problem with LaTeX's default handling of this double-mapping is that "`{\sffamily\slshape\pounds}`" produces "*$*", not "*£*". Other font encodings use separate slots for the two characters and are therefore robust to the problem of "£"/"$" conflicts. Authors who use `\pounds` should select a font encoding other than OT1 (as explained on page 6) or use the textcomp package, which redefines `\pounds` to use the TS1 font encoding.
- Character 173, `\-`, is shown as "-" but is actually a discretionary hyphen; it appears only at the end of a line.

While too large to incorporate into this document, a listing of ISO 8879:1986 SGML/XML character entities and their LaTeX equivalents is available from `http://www.bitjungle.com/~isoent/`. Some of the characters presented there make use of isoent, a LaTeX 2ε package (available from the same URL) that fakes some of the missing ISO glyphs using the LaTeX `picture` environment.[9]

7.6 About this document

History David Carlisle wrote the first version of this document in October, 1994. It originally contained all of the native LaTeX symbols (Tables 39, 47, 54, 79, 96, 98, 113, 114, 122, 126, 145, and a few tables that have since been reorganized) and was designed to be nearly identical to the tables in Chapter 3 of Leslie Lamport's book [Lam86]. Even the table captions and the order of the symbols within each table matched! The $\mathcal{AMS}$ symbols (Tables 40, 55, 56, 82, 83, 99, 103, 109, and 146) and an initial Math Alphabets table (Table 151) were added thereafter. Later, Alexander Holt provided the stmaryrd tables (Tables 41, 49, 57, 85, 93, and 110).

In January, 2001, Scott Pakin took responsibility for maintaining the symbol list and has since implemented a complete overhaul of the document. The result, now called, "The Comprehensive LaTeX Symbol List", includes the following new features:

- the addition of a handful of new math alphabets, dozens of new font tables, and thousands of new symbols
- the categorization of the symbol tables into body-text symbols, mathematical symbols, science and technology symbols, dingbats, and other symbols, to provide a more user-friendly document structure
- an index, table of contents, and a frequently-requested symbol list, to help users quickly locate symbols
- symbol tables rewritten to list the symbols in alphabetical order
- appendices to provide additional information relevant to using symbols in LaTeX
- tables showing how to typeset all of the characters in the ASCII and Latin 1 font encodings

Furthermore, the internal structure of the document has been completely altered from David's original version. Most of the changes are geared towards making the document easier to extend, modify, and reformat.

Build characteristics Table 234 on the following page lists some of this document's build characteristics. Most important is the list of packages that LaTeX couldn't find, but that `symbols.tex` otherwise would have been able to take advantage of. Complete, prebuilt versions of this document are available from CTAN (`http://www.ctan.org/` or one of its many mirror sites) in the directory `tex-archive/info/symbols/comprehensive`. Table 235 shows the package date (specified in the `.sty` file with `\ProvidesPackage`) for each package that was used to build this document and that specifies a package date. Packages are not listed in any particular order in either Table 234 or 235.

[9] isoent is not featured in this document, because it is not available from CTAN and because the faked symbols are not "true"

TABLE 234: Document Characteristics

Characteristic	Value
Source file:	`symbols.tex`
Build date:	September 22, 2005
Symbols documented:	3300
Packages included:	textcomp latexsym amssymb stmaryrd euscript wasysym pifont manfnt bbding undertilde ifsym tipa tipx extraipa wsuipa phonetic ulsy ar metre txfonts mathabx fclfont skak ascii dingbat skull eurosym esvect yfonts yhmath esint mathdots trsym universa upgreek overrightarrow chemarr chemarrow nath trfsigns empheq phaistos arcs t5 t4phonet holtpolt semtrans dictsym extarrows protosem harmony hieroglf cclicenses accents nicefrac bm mathrsfs zapfchan bbold mbboard dsfont bbm
Packages omitted:	*none*

7.7 Copyright and license

The Comprehensive LaTeX Symbol List
Copyright © 2005, Scott Pakin

This work may be distributed and/or modified under the conditions of the LaTeX Project Public License, either version 1.3 of this license or (at your option) any later version. The latest version of this license is in

`http://www.latex-project.org/lppl.txt`

and version 1.3 or later is part of all distributions of LaTeX version 2003/12/01 or later.

This work has the LPPL maintenance status "maintained".

The Current Maintainer of this work is Scott Pakin.

This work consists of the files `symbols.tex`, `README`, `SYMLIST`, `lightbulb10.mf`, and `lightbulb.mf`, `lightbulb.map`, and all PDF, PostScript, Encapsulated PostScript, and PostScript font files derived from those.

characters; they exist in only one size, regardless of the body text's font size.

TABLE 235: Package versions used in the preparation of this document

Name	Date
textcomp	2000/08/30
latexsym	1998/08/17
amssymb	1996/11/03
stmaryrd	1994/03/03
euscript	1995/01/06
wasysym	2003/10/30
pifont	2000/01/12
manfnt	1999/07/01
bbding	1999/04/15
undertilde	2000/08/08
ifsym	2000/04/18
tipa	2002/08/08
tipx	2003/01/01
wsuipa	1994/07/16
metre	2001/12/05
txfonts	2000/12/15
skak	2003/01/25
dingbat	2001/04/27
skull	2002/01/23
eurosym	1998/08/06
yfonts	2003/01/08
mathdots	2001/02/28
trsym	2000/06/25
universa	98/08/01
upgreek	2003/02/12
chemarr	2001/06/22
empheq	2004/04/14
phaistos	2004/04/23
arcs	2004/05/09
t4phonet	2004/06/01
semtrans	1998/02/10
dictsym	2004/07/26
extarrows	2002/03/30
protosem	2005/03/18
harmony	2005/05/10
hieroglf	2000/09/23
cclicenses	2005/05/20
accents	2000/08/06
nicefrac	1998/08/04
bm	1999/07/05

References

[AMS99] American Mathematical Society. *User's Guide for the amsmath Package (Version 2.0)*, December 13, 1999. Available from `ftp://ftp.ams.org/pub/tex/doc/amsmath/amsldoc.pdf`.

[Ber01] Karl Berry. Fontname: Filenames for TEX fonts, June 2001. Available from `http://www.ctan.org/tex-archive/info/fontname`.

[Dow00] Michael Downes. Short math guide for LATEX, July 19, 2000. Version 1.07. Available from `http://www.ams.org/tex/short-math-guide.html`.

[Gib97] Jeremy Gibbons. Hey—it works! *TUGboat*, 18(2):75–78, June 1997. Available from `http://www.tug.org/TUGboat/Articles/tb18-2/tb55works.pdf`.

[Knu86a] Donald E. Knuth. *The TEXbook*, volume A of *Computers and Typesetting*. Addison-Wesley, Reading, MA, USA, 1986.

[Knu86b] Donald E. Knuth. *The METAFONTbook*, volume C of *Computers and Typesetting*. Addison-Wesley, Reading, MA, USA, 1986.

[Lam86] Leslie Lamport. *LATEX: A document preparation system*. Addison-Wesley, Reading, MA, USA, 1986.

[LAT98] LATEX3 Project Team. A new math accent. *LATEX News*. Issue 9, June 1998. Available from `http://www.ctan.org/tex-archive/macros/latex/doc/ltnews09.pdf` (also included in many TEX distributions).

[LAT00] LATEX3 Project Team. LATEX 2_ε font selection, January 30, 2000. Available from `http://www.ctan.org/tex-archive/macros/latex/doc/fntguide.ps` (also included in many TEX distributions).

Index

If you're having trouble locating a symbol, try looking under "T" for "`\text`...". Many text-mode commands begin with that prefix. Also, accents are shown over/under a black box, e.g., "■" for "`\'`".

Some symbol entries appear to be listed repeatedly. This happens when multiple packages define identical (or nearly identical) glyphs with the same symbol name.[10]

Symbols

`\"` (■) 12
`\#` (#) 7, 76
`\$` ($) 7, 76
`\%` (%) 7, 76
`\&` (&) 7, 76
`\'` (■) 12
`(` (() 37
`)` ()) 37
`*` (*) 21
`\,` 75
`\-` (-) 77, 78
`\.` (■) 12
`/` (/) 37
`[` ([) 37
`]` (]) 37
`\^` (■) 12
`\^{}` (^) 76
`\|` (‖) 37
`\|` (■) 12
`\=` (■) 12
`\={}` (¯) 78
`|` (|) 37
`\_` (_) 7, 76
`\{` ({) 7, 37, 76
`\}` (}) 7, 37, 76
`\‘` (■) 12
`\~` (■) 12
`\~{}` (~) 76

A

a (esvect package option) . . . 42
`\a` (×) 61
`\AA` (Å) 8
`\aa` (å) 8
`\AAaleph` (ℵ) 62
`\AAayin` (ע) 62
`\AAbeth` (ב) 62
`\AAcht` (♫) 57
`\AAdaleth` (ד) 62
`\AAhe` (ה) 62
`\AAhelmet` (ת) 62
`\AAheth` (ח) 62
`\AAkaph` (כ) 62
`\AAlamed` (ל) 62
`\Aaleph` (א) 62
`\AApe` (פ) 62
`\AAqoph` (ק) 62
`\AAresh` (ר) 62
`\AAsade` (צ) 62
`\Aayin` (ע) 62
`\AAyod` (י) 62
`\Abeth` (ב) 62
absolute value . *see* `\lvert` *and* `\rvert`
abzüglich . . *see* `\textdiscount`
`\AC` (∼) 47
`\acarc` 14
`\acbar` 14
accents 12–16, 39, 40, 42, 49, 58, 69–70
  any character as 69
  extensible . . 40–43, 69–70
  multiple per character . 69
accents (package) 69, 79, 80
`\accentset` 69
`\Acht` (♪) 57
`\ACK` (♠) 49
`\AcPa` (ʔ) 57
`\acute` (■) 39
`\acutus` (■) 15
`\Adaleth` (ד) 62
Adobe Acrobat 74

`\adots` (⋰) 43, 69
advancing . *see* `\textadvancing`
`\AE` (Æ) 8
`\ae` (æ) 8
`\agemO` (ʊ) 44
`\Agimel` (ג) 62
`\Ahe` (ה) 62
`\Ahelmet` (ת) 62
`\Aheth` (ח) 62
`\ain` (ע) 15
`\Akaph` (כ) 62
`\Alad` (ד) 39
`\alad` (ד) 39
`\Alamed` (ל) 62
`\Alas` (ל) 39
`\alas` (ל) 39
`\aleph` (ℵ) 35, 44
`\Alif` (א) 12
`\alpha` (α) 34
alphabets
  African 8
  Cyrillic 64
  Greek 34, 35, 46
  Hebrew 35, 46
  hieroglyphic 63
  math 46
  phonetic 9–12
  proto-Semitic 62
  Vietnamese 8
`\alphaup` (α) 35
alpine symbols 59
`\amalg` (⨿) 19
`\Amem` (ם) 62
ampersand . . . . . *see* `\&`
$\mathcal{AMS}$ 6, 7, 19, 22, 25, 26, 28–31, 34–37, 39, 40, 43, 44, 46, 64, 78
amsbsy (package) 75
amsfonts (package) 19, 25, 28, 31, 44, 46
amsmath (package) . . 6, 34, 74
amssymb (package) 6, 19, 25, 28, 31, 44, 46, 79, 80, 82
amstext (package) 67, 68
`\Anaclasis` (÷) 61
`\anaclasis` (÷) 61

`\anchor` (⚓) 56
and . . . . . *see* `\wedge`
`\angle` (∠) 44
`\angle` (∠) 44
angles 44, 45
`\Anglesign` (⦡) 44
Ångström unit
  math mode *see* `\mathring`
  text mode . . . . . *see* `\AA`
`\Angud` (⟩) 39
`\angud` (⟩) 39
angular minutes . . . . *see* `\prime`
angular seconds . . . *see* `\second`
`\Angus` (⟨) 39
`\angus` (⟨) 39
`\Ankh` (☥) 59
`\annu` (■) 71
annuities 70
`\Antidiple` (<) 61
`\antidiple` (<) 61
`\Antidiple*` (≪) 61
`\antidiple*` (≪) 61
`\Antisigma` (⊃) 61
`\antisigma` (⊃) 61
`\Anun` (ן) 62
`\Ape` (ף) 62
APL
  modifiers 49
  symbols 49
`\APLbox` (□) 49
`\APLcirc` (■) 49
`\APLcomment` (⍝) 49
`\APLdown` (▽) 49
`\APLdownarrowbox` (⍗) 49
`\APLinput` (⍞) 49
`\APLinv` (⍣) 49
`\APLleftarrowbox` (⍇) 49
`\APLlog` (⍟) 49
`\APLminus` (¯) 49
`\APLnot` (■) 49

[10] This occurs frequently between amssymb and mathabx, for example.

\APLrightarrowbox (⊡) 49
\APLstar (⋆) 49
\APLup (△) 49
\APLuparrowbox (⍐) 49
\APLvert (∣) 49
\apprge (≳) 29
\apprle (≲) 29
\approx (≈) 25
\approxeq (≊) 25
\Aqoph (ᕴ) 62
\Aquarius (♒) 48
\aquarius (≈≈) 48
\AR (Ⓡ) 47
ar (package) 47, 79
\arccos (arccos) 34
arcminutes . . . . . *see* \prime
arcs (package) 15, 79, 80
arcseconds . . . . . *see* \second
\arcsin (arcsin) 34
\arctan (arctan) 34
\Aresh (ᖇ) 62
\arg (arg) 34
\Aries (♈) 48
\Aries (ϒ) 48
\aries (♈) 48
\ArrowBoldDownRight (➘) . 51
\ArrowBoldRightCircled (➲) 51
\ArrowBoldRightShort (➧) . . 51
\ArrowBoldRightStrobe (➠) 51
\ArrowBoldUpRight (➚) . . . 51
\Arrownot ()/ 33
\arrownot ()/ 33
arrows 31–33, 51, 64
diagonal, for reducing subexpressions 40
double-headed, diagonal 68
extensible 40–42
negated 31, 32
\Arrowvert (‖) 37
\arrowvert (∣) 37
Arseneau, Donald 68–70
\Asade (ᛉ) 62
\Asamekh (◇) 62
ASCII 6, 8, 49, 75–76, 78
table 76
ascii (package) 49, 76, 79
\ascnode (ᘯ) 48
\Ashin (ω) 62
aspect ratio 47
\ast (∗) 21
\ast (∗) 19
\Asteriscus (※) 61
\asteriscus (※) 61
\Asterisk (⁎) 21
\Asterisk (✻) 53
\asterisk (∗) 21
\AsteriskBold (✱) 53
\AsteriskCenterOpen (✲) . . 53
\AsteriskRoundedEnds (❃) . 53
asterisks 21, 53, 54
\AsteriskThin (✳) 53
\AsteriskThinCenterOpen (✴) 53
astrological symbols 48
astronomical symbols 48
\astrosun (☉) 48
\asymp (≍) 25
\atan (atan) 74
\ataribox (🅐) 57
\Atav (+) 62
\Ateth (ᘮ) 62
\AtForty (🅰) 58
\AtNinetyFive (🅰) 58
atomic math objects . . . 34, 75
\AtSixty (🅰) 58
\autoleftarrow (⟵) . . . 41
\autoleftrightharpoons (⥊) 41
\autorightarrow (⟶) . . 41
\autorightleftharpoons (⥋) 41
\Avav (ᖍ) 62
average 19
\Ayn (ᘿ) 12
\Ayod (ᖻ) 62
\Azayin (=) 62

B

\B 8
\B (ᘏ) 61
b (esvect package option) . . . 42
\b (■) 12
\b (◡) 61
\babygamma (ɤ) 10
\backepsilon (϶) 25
\backprime (‵) 44
\backsim (∽) 25
\backsimeq (⋍) 25
\backslash (\) 37, 44
banana brackets . . . . . *see* \llparenthesis *and* \rrparenthesis
\bar (▪) 39
\barb (ƀ) 10
\bard (ɗ) 10
\bari (ɨ) 10
\barin (ɘ̄) 36
\barj (ɟ) 11
\barl (ɬ) 10
\barlambda (ƛ) 11
\barleftharpoon (⥫) 33
\baro (ɸ) 20
\baro (ɸ vs. ɵ) 65
\baro (ɵ) 11
\barp (ᵽ) 11
barred letters 66
\barrightharpoon (⥭) 33
\barsci (ɨ) 11
\barscu (ʉ) 11
\baru (ʉ) 11
\barwedge (⊼) 21
\barwedge (⊼) 19
\Bat (🦇) 59
\baucircle (●) 55
\bauforms ( ) 59
\bauhead ( ) 59
\bausquare (■) 55
\bautriangle (▲) 55
\BB (ᘒ) 61
\Bb (ᘓ) 61
\bB (ᘒ) 61
\bb (ᘓ) 61
\bba (ᘭ) 61
\bbalpha (𝛂) 46
\bbar (ƀ) 66
\bbb (ᘳ) 61
\bbbeta (ϐ) 46
\Bbbk (𝕜) 36
bbding (package) . 51–53, 55, 56, 65, 79, 80
\bbdollar ($) 46
\bbetter (⁒) 60
\bbeuro (€) 46
\bbfinalnun (𝍐) 46
\bbgamma (ɣ) 46
bbgreekl (mathbbol package option) 46
\BBm (ᘔ) 61
\Bbm (ᘔ) 61
\bBm (ᘔ) 61
bbm (package) 46, 79
\bbm (ᘓ) 61
\bbmb (ᘳ) 61
\bbmx (ᘓ) 61
\bbnabla (▽) 46
bbold (package) 46, 79
\bbpe (ᘐ) 46
\bbqof (ᘑ) 46
\bbslash (⧵) 20
\bbyod (ᵑ) 46
\bdecisive (−+) 60
\Beam (▬) 49
\Bearing (⍙) 49
\because (∵) 25
\BEL (•) 49
\bell (🔔) 57
Berry, Karl 81
\beta (β) 34
\betaup (β) 35
\beth (ℶ) 35
\betteris (⌓) 60
\between (≬) 27
\between (≬) 25
\bibridge (🌉) 14
\Bicycle (🚲) 55
\bigast (∗) 21
\bigbox (□) 22
\bigboxasterisk (⧆) 23
\bigboxbackslash (⧅) 23

\bigboxbot (⊞) 23
\bigboxcirc (⊡) 23
\bigboxcoasterisk (⊛) . . . 23
\bigboxdiv (⊟) 23
\bigboxdot (⊡) 23
\bigboxleft (⊞) 23
\bigboxminus (⊟) 23
\bigboxplus (⊞) 23
\bigboxright (⊞) 23
\bigboxslash (⊠) 23
\bigboxtimes (⊠) 23
\bigboxtop (⊞) 23
\bigboxtriangleup (⊡) . . . 23
\bigboxvoid (□) 23
\bigcap (⋂) 21
\bigcirc (○) 19
\BigCircle (○) 54
\bigcoast (⊹) 21
\bigcomplementop (∁) 23
\BigCross (⨯) 54
\bigcup (⋃) 21
\bigcurlyvee (⋎) 23
\bigcurlyvee (⋎) 22
\bigcurlywedge (⋏) 23
\bigcurlywedge (⋏) 22
\BigDiamondshape (◇) 54
\BigHBar (—) 54
\biginterleave (⫼) 22
\BigLowerDiamond (⬙) 54
\bignplus (⨁) 22
\bigoasterisk (⊛) 23
\bigobackslash (⦸) 23
\bigobot (⦶) 23
\bigocirc (⊚) 23
\bigocoasterisk (⊛) 23
\bigodiv (⨼) 23
\bigodot (⊙) 21
\bigoleft (⦵) 23
\bigominus (⊖) 23
\bigoplus (⊕) 21
\bigoright (⦶) 23
\bigoslash (⊘) 23
\bigotimes (⊗) 21
\bigotop (⦶) 23
\bigotriangleup (⊚) 23
\bigovoid (⦵) 23
\bigparallel (⫼) 22
\bigplus (+) 23
\BigRightDiamond (⬗) 54
\bigsqcap (⨅) 23
\bigsqcap (⨅) 22
\bigsqcapplus (⨄) 24
\bigsqcup (⨆) 21
\bigsqcupplus (⨆) 24
\BigSquare (□) 54
\bigsquplus (⨄) 23
\bigstar (★) 21
\bigstar (★) 44
\bigtimes (×) 23
\BigTriangleDown (▽) 54
\bigtriangledown (▽) 22
\bigtriangledown (▽ vs. ▽) 65
\bigtriangledown (▽) 19
\BigTriangleLeft (◁) 54
\BigTriangleRight (▷) . . . 54
\BigTriangleUp (△) 54
\bigtriangleup (△) 22
\bigtriangleup (△ vs. △) . 65
\bigtriangleup (△) 19
\biguplus (⨄) 21
\bigvarstar (★) 21
\BigVBar (‖) 54
\bigvee (⋁) 21
\bigwedge (⋀) 21
\binampersand (&) 20
binary operators 19–21
binary relations 25–30
  negated 26, 27
\bindnasrepma (⅋) 20
\Biohazard (☣) 50
biological symbols 50
bishop . . . . . *see* chess symbols
\bishoppair (⚇) 60
blackboard bold *see* alphabets, math
\blackdiamond (⬥) 21
\blacklozenge (⧫) 44
\blacksmiley (☻) 57
\blacksquare (■) 44
\blacktriangle (▲) 44
\blacktriangledown (▾) . . . 21
\blacktriangledown (▼) . . . 44
\blacktriangleleft (◂) . . . 21
\blacktriangleleft (◀) . . . 30
\blacktriangleright (▸) . . 21
\blacktriangleright (▶) . . 30
\blacktriangleup (▴) 21
blank . . . . . *see* \textblank
\Bleech (△) 58
\blitza (ϟ) 19, 33
\blitzb (ϟ) 33
\blitzc (ϟ) 33
\blitzd (ϟ) 33
\blitze (ϟ) 33
\Bm (⸿) 61
bm (package) 75, 79, 80
\bm 75
\bm (⸿) 61
\bmod 34
body-text symbols 7–18
bold symbols 75
\boldmath 75
\boldsymbol 75
born . . . . . *see* \textborn
\bot (⊥) 19, 35, 67
\botdoteq (≓) 27
\Bouquet (𝅘𝅥) 59
\Bowtie (⋈) 57
\bowtie (⋈) 25
\Box (□) 44
\Box (□) 44
\boxast (⊞) 20
\boxasterisk (⊛) 21
\boxbackslash (⧅) 21
\boxbar (⧈) 20
\boxbot (⊟) 21
\boxbox (⧈) 20
\boxbslash (⧅) 20
\boxcirc (⊡) 21
\boxcircle (⧇) 20
\boxcoasterisk (⊛) 21
\boxdiv (⊟) 21
\boxdot (⊡) 21
\boxdot (⊡) 19, 20
\boxdotLeft (⇐⊡) 32
\boxdotleft (←⊡) 32
\boxdotRight (⊡⇒) 32
\boxdotright (⊡→) 32
\boxempty (□) 20
\boxLeft (⇐□) 32
\boxleft (⊞) 21
\boxleft (←□) 32
\boxminus (⊟) 21
\boxminus (⊟) 19
\boxplus (⊞) 21
\boxplus (⊞) 19
\boxRight (□⇒) 32
\boxright (⊞) 21
\boxright (□→) 32
\boxslash (⊠) 21
\boxslash (⧄) 20
\boxtimes (⊠) 21
\boxtimes (⊠) 19
\boxtop (⊞) 21
\boxtriangleup (⊡) 21
\boxvoid (□) 21
\boy (♂) 48
\braceld (⎩) 70
\bracerd (⎭) 70
\bracevert (⎪) 37
brackets . . . . . *see* delimiters
braket (package) 37
breve . . . . . *see* accents
\breve (̆) 39
\breve (̆) 15
\brokenvert (¦) 57
Bronger, Torsten 67
\BS (◘) 49
\BSEfree (⌬) 50
\bullet (•) 19
bullseye . . . *see* \textbullseye
\Bumpedeq (≑) 27
\bumpedeq (≏) 27
\Bumpeq (≎) 25
\bumpeq (≏) 25
\bupperhand (⁒) 60

C

\C (|) 61
c (esvect package option) . . . 42
\c (̧) 12, 77
\c (|) 61
calrsfs (package) 46
\CAN (↑) 49
cancel (package) 40
\Cancer (♋) 48

\cancer (♋) 48
\Cap (⋒) 19
\cap (∩) 21
\cap (⋂) 19
\Capricorn (♑) 48
\capricornus (♑) 48
card suits 44, 56
cardinality . . . . . *see* \aleph
care of (℅) 45
caret . . . . . *see* \^
Carlisle, David 1, 78
carriage return . 49, 56, 64, *see also* \hookleftarrow
\carriagereturn (↵) 56
castle . . . . . *see* chess symbols
\Catalexis (ᶺ) 61
\catalexis (ᶺ) 61
catamorphism . . . . . *see* \llparenthesis *and* \rrparenthesis
\Cc (‖) 61
\cc (🅭) 17
\cc (‖) 61
\ccby (🅭) 17
\Ccc (⫴) 61
cclicenses (package) . . 17, 79, 80
\ccnc (🅭) 17
\ccnd (🅭) 17
\ccsa (🅭) 17
\cdot (·) 19, 66
\cdotp (·) 43
\cdots (⋯) 43
Cedi . *see* \textcolonmonetary
cedilla . . . . . *see* accents
\celsius (℃) 47
\Celtcross (✟) 59
\cent (¢) 16
\centerdot (▪) 21
\centerdot (∙) 19
\centre (⊞) 60
cents . . . . . *see* \textcent
\CEsign (CE) 50
\changenotsign 27
\char 6, 64
\check (🗹) 39
check marks 52, 53, 55, 56
\checked (✓) 57
\CheckedBox (☑) 53
\Checkedbox (☑) 55
\Checkmark (✓) 52
\checkmark (✓) 7
\checkmark (✓ vs. ✓) 65
\checkmark (✓) 56
\CheckmarkBold (✔) 52
chemarr (package) . . . 41, 79, 80
chemarrow (package) . 33, 41, 79
\chemarrow (→) 33
chess symbols 60
\chi (χ) 34
\chiup (χ) 35
\circ (∘) 19, 45
\circeq (≗) 27
\circeq (≗) 25
\CIRCLE (●) 57
\Circle (○) 54
\Circle (○ vs. ○) 65
\Circle (○) 57
\circlearrowleft (↺) 32
\circlearrowleft (↺) 31
\circlearrowright (↻) 32
\circlearrowright (↻) 31
circled numbers 53
\CircledA (Ⓐ) 59
\circledast (⊛) 19
\circledbar (⦶) 20
\circledbslash (⦸) 20
\circledcirc (⊚) 19
\circleddash (⊝) 19
\circleddot . . . . . *see* \odot
\circleddotleft (↩⊙) 32
\circleddotright (⊙↪) 32
\circledgtr (⧁) 26
\circledless (⧀) 26
\circledminus . . . *see* \ominus
\circledotleft . . . . . *see* \circleddotleft
\circledotright . . . . . *see* \circleddotright
\circledplus . . . . . *see* \oplus
\circledR (®) 7, 36
\circledS (Ⓢ) 36
\circledslash . . . *see* \oslash
\circledtimes . . . *see* \otimes
\circledvee (⩒) 20
\circledwedge (⩓) 20
\circleleft (↩○) 32
\circleright (○↪) 32
circles 54, 55, 57
\CircleShadow (◯) 55
\CircleSolid (●) 55
\Circpipe (⭘) 49
\circplus (⨣) 21
\Circsteel (●) 49
circumflex . . . . . *see* accents
\circumflexus (◙) 15
\CleaningA (Ⓐ) 58
\CleaningF (Ⓕ) 58
\CleaningFF (Ⓕ) 58
\CleaningP (Ⓟ) 58
\CleaningPP (Ⓟ) 58
\clickb (☉) 11
\clickc (☾) 11
\clickt (☂) 11
\clock (🕒) 57
clock symbols 60
\Clocklogo (🕒) 55
\closedniomega (ɷ) 11
\closedrevepsilon (ɜ) 11
\Cloud (☁) 59
clovers 53, 54
clubs (suit) 44, 56
\clubsuit (♣) 44
\coAsterisk (⁂) 21
\coasterisk (⁎) 21
\Coffeecup (☕) 55
\colon 43
\colon (:) 43
\Colonapprox (::≈) 26
\colonapprox (:≈) 26
\Coloneq (::−) 26
\coloneq (:=) 27
\coloneq (:−) 26
\Coloneqq (::=) 26
\coloneqq (:=) 19, 26
\Colonsim (::∼) 26
\colonsim (:∼) 26
\comment (RR) 60
communication symbols 49
comp.text.tex (newsgroup) . 6, 19, 66–70
\compensation (≊) 60
\complement (∁) 36
\complement (∁) 36
complex numbers (ℂ) . . . . *see* alphabets, math
Comprehensive TEX Archive Network 1, 6, 40, 46, 78
computer hardware symbols . 49
\ComputerMouse (🖱) 49
\cong (≅) 25
conjunction . . . . . *see* \wedge
\conjunction (♂) 48
contradiction symbols . . 19, 33
control characters 49
\convolution (∗) 21
\coprod (∐) 21
copyright 7, 17, 77
\copyright (©) 7
\corner (⌝) 15
\Corresponds (≙) 44
\corresponds (≙) 27
\cos (cos) 34, 74
\cosh (cosh) 34
\cot (cot) 34
\coth (coth) 34
\counterplay (⥲) 60
Courier (PostScript font) . . . 16
CP1252 78
\CR (♪) 49
Creative Commons licenses . 17
\Cross (╳) 54
\Cross (✝ vs. ✝ vs. ╳) 65
\Cross (✝) 59
\Cross (✝) 52
\crossb (♄) 11
\CrossBoldOutline (✝) 52
\CrossClowerTips (✣) 52
\crossd (♁) 11
\Crossedbox (☒) 55
crosses 52, 59
\crossh (ħ) 11
\CrossMaltese (✠) 52
\crossnilambda (ƛ) 11
\CrossOpenShadow (✞) 52

\CrossOutline (✝) 52
\crtilde (m̃) 14
crucifixes 52, 59
\Crux (†) 39
\crux (†) 39
\csc (csc) 34
CTAN *see* Comprehensive TEX Archive Network
\Cube 60, 64
cube root . . . . . *see* \sqrt
\Cup (⋓) 19
\cup (∪) 21
\cup (∪) 19, 66, 74
\curlyc (ȼ) 11
\curlyeqprec (⋞) 27
\curlyeqprec (⋞) 25
\curlyeqsucc (⋟) 27
\curlyeqsucc (⋟) 25
\curlyesh (ʃ) 11
\curlyvee (⋎) 21
\curlyvee (⋎) 19
\curlyveedownarrow (⋎) . . . 20
\curlyveeuparrow (⋎) 20
\curlywedge (⋏) 21
\curlywedge (⋏) 19
\curlywedgedownarrow (⋏) . 20
\curlywedgeuparrow (⋏) . . . 20
\curlyyogh (ʒ) 11
\curlyz (ƶ) 11
\currency (¤) 16
currency symbols 16, 46
\curvearrowbotleft (⤾) . . 32
\curvearrowbotleftright (↭) 32
\curvearrowbotright (⤿) . . 32
\curvearrowleft (↶) 32
\curvearrowleft (↶) 31
\curvearrowleftright (↭) . 32
\curvearrowright (↷) 32
\curvearrowright (↷) 31
\Cutleft (⋉) 51
\Cutline (┈) 51
cutoff subtraction . *see* \dotdiv
\Cutright (⋊) 51

D

\D (m̤) 15
d (esvect package option) . . . 42
\d (ṃ) 12
\dag (†) 7
\dagger (†) 19
\daleth (ℸ) 35
dangerous bend symbols . . . 55
\dasharrow . . . . . *see* \dashrightarrow
\dashint (⨍) 68
\dashleftarrow (⇠) 31
\dashleftrightarrow (⇿) . . 32
\dashrightarrow (⇢) 31
\DashV (⫤) 27
\Dashv (⫤) 27
\dashv (⊣) 25
\dashVv (⫣) 27
\davidsstar (✡) 53
\DavidStar (✡) 53
\DavidStarSolid (✪) 53
\dbar (đ) 66
\dbend (⤎) 55
dblaccnt (package) 69
\DCa (◄) 49
\DCb (↕) 49
\DCc (‼) 49
\DCd (¶) 49
\DD (ⅅ) 57
\ddag (‡) 7
\ddagger (‡) 19
\ddashint (⨎) 68
\ddddot (m⃜) 39
\dddot (m⃛) 39
\DDohne (ⅅ̸) 57
\ddot (m̈) 39
\ddots (⋱) 43, 69
\DeclareFontFamily 73
\DeclareFontShape 73
\DeclareMathOperator 74
\DeclareMathOperator* . . . 74
\declareslashed 67
definite-description operator (ι) 66
definition symbols 19, 70
\deg (deg) 34
\degree (○) 45
\degree (°) 47
degrees . . . . . *see* \textdegree
\DEL (⌂) 49
\Deleatur . . . . . *see* \Denarius
delimiters 36–39
text-mode 39
variable-sized 37, 38
\Delta (Δ) 34
\delta (δ) 34
\deltaup (δ) 35
\Denarius (ℵ) 16
\dental (m̪) 14
derivitive, partial . *see* \partial
\descnode (ᘐ) 48
\det (det) 34
\devadvantage (♡) 60
\Dfourier (⤷○) 27
\dfourier (○⤳) 27
\DFT (▬⊣) 39
\dft (⊢▬) 39
\DH (Đ) 8
\DH (Đ) 11
\dh (ð) 8
\dh (ð) 11
diacritics . . . . . *see* accents
\diaeresis (m̈) 15
diæresis . . . . . *see* accents
\diagdown (╲) 45
\diagdown (╲) 44
\diagonal (⧸) 60
\diagup (╱) 45
\diagup (╱) 44
\diameter (∅) 45
\diameter (⌀) 19
\diameter (⌀) 57
\Diamond (◇) 44
\Diamond (◇) 44
\diamond (⋄) 19
\Diamondblack (◆) 44
\Diamonddot (⟐) 44
\DiamonddotLeft (⇐⟐) 32
\Diamonddotleft (↤⟐) 32
\DiamonddotRight (⟐⇒) 32
\Diamonddotright (⟐↦) 32
\DiamondLeft (⇐◇) 32
\Diamondleft (↤◇) 32
\DiamondRight (◇⇒) 32
\Diamondright (◇↦) 32
diamonds 54, 55
diamonds (suit) 44, 56
\DiamondShadowA (◈) 54
\DiamondShadowB (◈) 54
\DiamondShadowC (◈) 54
\Diamondshape (◇) 54
\DiamondSolid (◆) 55
\diamondsuit (♢) 44
\diatop 15, 69
\diaunder 15, 69
dice 60, 64
dictionary symbols 9–12, 63
dictsym (package) . . . 63, 79, 80
died . . . . . *see* \textdied
differential, inexact . *see* \dbar
\digamma (ϝ) 34
digits 44
circled 53
LCD 47
Mayan 43
old-style 17
segmented 47
\dim (dim) 34
\ding 8, 51–56
dingautolist 53
dingbat (package) 51, 52, 56, 65, 79, 80
dingbat symbols 51–56
\Diple (⫸) 61
\diple (⫸) 61
\Diple* (⫸) 61
\diple* (⫸) 61
discount . . . *see* \textdiscount
discretionary hyphen 78
disjunction . . . . . *see* \vee
\displaystyle 67–69, 74
ditto marks . *see* \textquotedbl
\div (÷) 19
\divdot (⨪) 21
\divideontimes (⋇) 21
\divideontimes (⋇) 19
\divides (∣) 27
division 19, 40
non-commutative 43

division times . . . . . *see* \divideontimes
divorced . . . *see* \textdivorced
\DJ (Đ) 8
\dj (đ) 8
\dlbari (ɨ) 11
\DLE (►) 49
\dlsh (↲) 32
does not divide . . . . *see* \nmid
does not exist . . . *see* \nexists
\Dohne (Ø⃝) 57
dollar . . . . . *see* \textdollar
dollar sign . . . . . *see* \$
\Dontwash (🖂) 58
\dot (ȧ) 39
dot symbols 43
\dotcup (⊍) 66
\dotdiv (∸) 21
\Doteq . . . . . *see* \doteqdot
\doteq (≐) 25
\doteqdot (≑) 25
dotless *i* (ı)
  math mode 39, 44
  text mode 12
dotless *j* (ȷ)
  math mode 39, 44
  text mode 12
\dotplus (∔) 21
\dotplus (∔) 19
\dots (. . .) 7
dots (ellipses) 7, 43, 44, 69
\dotsb (· · ·) 43
\dotsc (. . .) 43
\dotseq (≑) 27
\dotsi (· · ·) 43
\dotsint (∫···∫) 25
\dotsm (· · ·) 43
\dotso (. . .) 43
dotted union (⊍) 74
\dottedtilde (ã̇) 14
\dottimes (⨱) 21
\double 38
\doublebarwedge (⩞) 21
\doublebarwedge (⩞) 19
\doublecap . . . . . *see* \Cap
\doublecap (⋒) 21
\doublecup . . . . . *see* \Cup
\doublecup (⋓) 21
\doublepawns (♙♙) 60
\doubletilde (ã̃) 14
\DOWNarrow (▼) 57
\Downarrow (⇓) 31, 37
\downarrow 74
\downarrow (↓) 31, 37
\downbracketfill 70
\downdownarrows (⇊) 32
\downdownarrows (⇊) 31
\downdownharpoons (⥥) 33
Downes, Michael J. 34, 81
\downharpoonleft (⇃) 33
\downharpoonleft (⇃) 31
\downharpoonright (⇂) 33
\downharpoonright (⇂) 31
\downp (˯) 15
\downparenthfill 70
\downt (⊤) 15
\downtouparrow (↻) 32
\downuparrows (⇵) 32
\downupharpoons (⥯) 33
\drsh (↳) 32
\DS (𝔖) 57
\Ds (𝔰) 57
\dsaeronautical (🛩) 63
\dsagricultural (🌾) 63
\dsarchitectural (🏛) 63
\dsbiological (🧬) 63
\dschemical (⚗) 63
\dscommercial (🏦) 63
dsfont (package) 46, 79
\dsheraldical (⍰) 63
\dsjuridical (⚖) 63
\dsliterary (🕮) 63
\dsmathematical (𝔸) 63
\dsmedical (💉) 63
\dsmilitary (⚔) 63
\dsrailways (🚆) 63
\dstechnical (⚙) 63
DVI 17, 71
\dz (ʣ) 11

E

e (esvect package option) . . . 42
\e (e) 36
ε-TEX 37
\Earth (⊕) 48
\Earth (♁) 48
\earth (♁) 48
\Ecommerce (@) 16
\EightAsterisk (✳) 53
\EightFlowerPetal (❁) . . . 53
\EightFlowerPetalRemoved (✵) 53
\eighthnote (♪) 57
\EightStar (✴) 53
\EightStarBold (✷) 53
\EightStarConvex (✳) 53
\EightStarTaper (✴) 53
\ejective (ʔ) 11
electrical symbols 47
electromotive force (ℰ) . . . . *see* alphabets, math
\ell (ℓ) 35
\Ellipse (⬭) 55
ellipses (dots) 7, 43, 44, 69
ellipses (ovals) 55
\EllipseShadow (⬭) 55
\EllipseSolid (⬬) 55
\EM (↓) 49
\Email (✉) 49
\Emailct (➷) 49
\emgma (ɱ) 11
empheq (package) . . . 41, 79, 80
\emptyset (∅) 44
end of proof 44
\ending (⊥) 60
\eng (ŋ) 10
engineering symbols 47, 49
\engma (ŋ) 11
\ENQ (♣) 49
entails . . . . . *see* \models
enter . . . . . *see* carriage return
\Envelope (✉) 56
\enya (ɲ) 11
\EOT (♦) 49
\epsi (ε) 11
\epsilon (ϵ) 34
\epsilonup (ϵ) 35
\eqbumped (⩮) 27
\eqcirc (≖) 27
\eqcirc (≖) 25
\Eqcolon (−::) 26
\eqcolon (=:) 27
\eqcolon (−:) 26
\Eqqcolon (=::) 26
\eqqcolon (=:) 26
\eqsim (≂) 26
\eqslantgtr (⪖) 30
\eqslantgtr (⪖) 29
\eqslantless (⪕) 30
\eqslantless (⪕) 29
\equal (⩵) 60
\equalsfill 19, 70
equilibrium . . . . . *see* \rightleftharpoons
\equiv (≡) 19, 25
equivalence . . . . . *see* \equiv, \leftrightarrow, *and* \threesim
\er (ɚ) 10
es-zet . . . . . *see* \ss
\ESC (←) 49
escapable characters 7
\esh (ʃ) 10
\esh (ʃ) 11
esint (package) 25, 79
\Estatically (🛆) 50
estimated . *see* \textestimated
esvect (package) 42, 79
\eta (η) 34
\etaup (η) 35
\ETB (↕) 49
\etc (⁊) 60
\eth (ð) 44
\eth (ð) 10
\eth (ð) 11
\ETX (♥) 49
eufrak (package) 46
Euler Roman 35
\EUR (€) 16
\EURcr (€) 16
\EURdig (€) 16
\EURhv (€) 16
\euro 16
euro signs 16
  blackboard bold 46

eurosym (package) . . . 16, 79, 80
\EURtm (€) 16
euscript (package) . . . 46, 79, 80
evaluated at (|) 37
exclusive or 64
\exists (∃) 36
\exists (∃) 35
\exp (exp) 34
\Explosionsafe (🕸) 50
extarrows (package) . . 42, 79, 80
extensible accents 40–43, 69–70
extensible arrows 40–42
extensible tildes 40, 42
extension characters 33
extraipa (package) 14, 79
\eye (👁) 56
\EyesDollar ($) 16

F

f (esvect package option) . . . 42
\fallingdotseq (≒) 27
\fallingdotseq (≒) 25
\FallingEdge (⦦) 47
\fatbslash (⧹) 20
\fatsemi (⨟) 20
\fatslash (⫽) 20
\FAX (📠) 49
\fax (📠) 49
\Faxmachine (📠) 49
fc (package) 8, 12
fclfont (package) 79
feet . . . . . *see* \prime *and* \textquotesingle
\FEMALE (⚲) 50
\Female (⚲) 50
\female (♀) 50
\FemaleFemale (⚢) 50
\FemaleMale (⚤) 50
\Ferli (◠■) 58
\Fermi (◠■) 58
Feynman slashed character notation 67
\FF (♀) 49
\FHBOLOGO (FHBO) 59
\FHBOlogo (FHBO) 59
\file (⇔) 60
\FilledBigCircle (●) 54
\FilledBigDiamondshape (◆) 54
\FilledBigSquare (■) 54
\FilledBigTriangleDown (▼) 54
\FilledBigTriangleLeft (◀) 54
\FilledBigTriangleRight (▶) 54
\FilledBigTriangleUp (▲) . 54
\FilledCircle (●) 54
\FilledCloud (🌥) 59
\FilledDiamondShadowA (◈) 54
\FilledDiamondShadowC (◈) 54
\FilledDiamondshape (◆) . . 54
\FilledHut (🛖) 59
\FilledRainCloud (🌧) 59
\FilledSectioningDiamond (❖) 60
\FilledSmallCircle (●) . . 54
\FilledSmallDiamondshape (◆) 54
\FilledSmallSquare (■) . . 54
\FilledSmallTriangleDown (▼) 54
\FilledSmallTriangleLeft (◀) 54
\FilledSmallTriangleRight (▶) 54
\FilledSmallTriangleUp (▲) 54
\FilledSnowCloud (🌨) 59
\FilledSquare (■) 54
\FilledSquareShadowA (🗗) . 54
\FilledSquareShadowC (🗗) . 54
\filledsquarewithdots (⬚) 56
\FilledSunCloud (🌥) 59
\FilledTriangleDown (▼) . . 54
\FilledTriangleLeft (◀) . . 54
\FilledTriangleRight (▶) . 54
\FilledTriangleUp (▲) . . . 54
\FilledWeakRainCloud (🌧) . 59
\finpartvoice (◒) 14
\finpartvoiceless (◒) 14
\fint (⨍) 24
\fint (⨍) 25
\Finv (Ⅎ) 36
\Finv (Ⅎ) 36
\Fire (🔥) 60
fish hook . . . . . *see* \strictif
\FiveFlowerOpen (❀) 53
\FiveFlowerPetal (✿) 53
\FiveStar (★) 53
\FiveStarCenterOpen (☆) . . 53
\FiveStarConvex (✯) 53
\FiveStarLines (☆) 53
\FiveStarOpen (☆) 53
\FiveStarOpenCircled (✪) . 53
\FiveStarOpenDotted (✯) . . 53
\FiveStarOutline (✯) 53
\FiveStarOutlineHeavy (✯) 53
\FiveStarShadow (☆) 53
\Fixedbearing (◬) 49
\fixedddots (⋱) 43
\fixedvdots (⋮) 43
fixmath (package) 75
\fj (fj) 11
\Flag (⚑) 59
\flap (ɾ) 11
\flapr (ɾ) 10
\flat (♭) 44, 57
\Flatsteel (▬) 49
florin . . . . . *see* \textflorin
flowers 53, 54
\Fog (🌫) 59
font encodings 6, 75, 78
  7-bit 6
  8-bit 6
  ASCII 78
  document 76
  Latin 1 78
  limiting scope of 6
  LY1 6
  OT1 6, 8, 12, 69, 75, 76, 78
  OT2 64
  T1 . . . . . 6, 8, 12, 76
  T4 . . . . . 8, 12, 15
  T5 . . . . . 8, 12
  TS1 78
fontdef.dtx (file) 66, 69
fontenc (package) . . 6, 8, 12, 76
\fontencoding 6
fonts, PostScript
  Courier 16
  Helvetica 16
  Symbol 35, 64
  Times 16
  Type 1 . . . . . 73, 74
  Zapf Chancery 46
  Zapf Dingbats 51, 53
\Football (⚽) 55
\forall (∀) 35
\Force (🡻) 49
\Forward (▶) 58
\ForwardToEnd (▶|) 58
\ForwardToIndex (▶▶|) 58
\FourAsterisk (✢) 53
\FourClowerOpen (❀) 53
\FourClowerSolid (✤) 53
\Fourier (—○) 27
\fourier (○—) 27
Fourier transform (ℱ) . . . . *see* alphabets, math
\FourStar (✦) 53
\FourStarOpen (✧) 53
\fourth (⁗) 45
fractions 45
fraktur . . . *see* alphabets, math
\frown (⌢) 25
\frownie (☹) 57
\Frowny (☹) 59
\FS (└) 49
\FullFHBO (FHBO) 59
\fullmoon (○) 48
\fullmoon (○) 48
\fullnote (◦) 57

G

\G (■) 12
g (esvect package option) . . . 42
\Game (⅁) 36

\Game (ↁ) 36
\Gamma (Γ) 34
\gamma (γ) 34
\gammaup (γ) 35
\Ganz (ꝏ) 57
\GaPa (▬) 57
\gcd (gcd) 34
\ge . . . . . *see* \geq
\Gemini (♊) 48
\Gemini (𝟐) 48
\gemini (𝌘) 48
genealogical symbols 57
\geneuro (€) 16
\geneuronarrow (€) 16
\geneurowide (€) 16
gensymb (package) 47
\Gentsroom (🕴) 55
geometric shapes 54, 55
\geq (⩾) 30
\geq (≥) 29, 30
\geqq (≧) 30
\geqq (≧) 29
\geqslant (⩾) 29
\gets . . . . . *see* \leftarrow
\gg (≫) 30
\gg (≫) 29
\ggcurly (⪼) 27
\ggg (⋙) 30
\ggg (⋙) 29
\ggg (⋙ vs. ⪢) 65
\gggtr . . . . . *see* \ggg
Gibbons, Jeremy 81
\gimel (ℷ) 35
\girl (⚲) 48
\glotstop (ʔ) 11
\glottal (ʔ) 11
\gluon (ൣൣൣൣൣൣൣ) 47
\gnapprox (⪊) 30
\gnapprox (⪊) 29
\gneq (⪈) 30
\gneq (⪈) 29
\gneqq (≩) 30
\gneqq (≩) 29
\gnsim (⋧) 30
\gnsim (⋧) 29
graphics (package) 66
graphicx (package) 15, 66
\grave (◼) 39
\gravis (◼) 15
greater-than signs . . . . . *see* inequalities
Greek 34, 35
  blackboard bold 46
  bold 34, 75
  upright 35
Gregorio, Enrico 67
\GS (↔) 49
\gtrapprox (⪆) 30
\gtrapprox (⪆) 29
\gtrdot (⋗) 30
\gtrdot (⋗) 29
\gtreqless (⋚) 30
\gtreqless (⋚) 29
\gtreqqless (⪌) 30
\gtreqqless (⪌) 29
\gtrless (≷) 30
\gtrless (≷) 29
\gtrsim (≳) 30
\gtrsim (≳) 29
\guillemotleft («) 8, 77
\guillemotright (») 8, 77
\guilsinglleft (‹) 8
\guilsinglright (›) 8
\gvertneqq (≩) 30
\gvertneqq (≩) 29

H

\H (◼) 12
h (esvect package option) . . . 42
\h (◼) 12
\HA (◼) 63
\Ha (◼) 63
háček . . . . . *see* accents
\Hail (◼) 59
\Halb (◼) 57
\HalfCircleLeft (◼) 55
\HalfCircleRight (◼) 55
\HalfFilledHut (◼) 59
\halflength (ˑ) 15
\halfnote (◼) 57
\HalfSun (◼) 59
Hamiltonian (ℋ) *see* alphabets, math
\HandCuffLeft (◼) 52
\HandCuffLeftUp (◼) 52
\HandCuffRight (◼) 52
\HandCuffRightUp (◼) 52
\HandLeft (◼) 52
\HandLeftUp (◼) 52
\HandPencilLeft (◼) 52
\HandRight (☞) 52
\HandRightUp (◼) 52
hands 52
\Handwash (◼) 58
\HaPa (▬) 57
harmony (package) 57, 58, 79, 80
harpoons 31, 33
\hash (#) 45
hash mark . . . . . *see* \#
\hat (◼) 39
\hausaB (Ɓ) 11
\hausab (ɓ) 11
\hausaD (Ɗ) 11
\hausad (ɗ) 11
\hausaK (Ƙ) 11
\hausak (ƙ) 11
\HB (◼) 63
\Hb (◼) 63
\HBar (—) 54
\hbar (ħ) 35, 36, 66
\HC (◼) 63
\Hc (◼) 63
\HCthousand (◼) 63
\HD (◼) 63
\Hd (◼) 63
\Hdual (◼) 63
\HE (◼) 63
\He (◼) 63
\Heart (♡) 59
hearts (suit) 44, 56
\heartsuit (♡) 44
Hebrew 35, 46
Helvetica (PostScript font) . . 16
\HERMAPHRODITE (◼) 50
\Hermaphrodite (◼) 50
\hexagon (⬡) 54
\Hexasteel (◼) 49
\hexstar (✳) 53
\HF (F) 47
\HF (◼) 63
\Hf (◼) 63
\HG (◼) 63
\Hg (◼) 63
\HH 58
\HH (◼) 63
\Hh (◼) 63
\Hhundred (◼) 63
\HI (◼) 63
\Hi (◼) 63
\Hibl (◼) 63
\Hibp (◼) 63
\Hibs (◼) 63
\Hibw (◼) 63
hieroglf (package) . . . 63, 79, 80
hieroglyphics 63
Hilbert space (ℋ) *see* alphabets, math
\hill (◼) 14
\HJ (◼) 63
\Hj (◼) 63
\HK (◼) 63
\Hk (◼) 63
\hksqrt (√◼) 68
\HL (◼) 63
\Hl (◼) 63
\HM (◼) 63
\Hm (◼) 63
\Hman (◼) 63
\Hmillion (◼) 63
\Hms (◼) 63
\HN (◼) 63
\Hn (◼) 63
\HO (◼) 63
\Ho (◼) 63
Holt, Alexander 1, 78
\holter (◼) 43

holtpolt (package) 43, 79
\hom (hom) 34
\Hone (ı) 63
\hookb (ɓ) 11
\hookd (ɗ) 11
\hookd (ɗ) 11
\hookg (ɠ) 11
\hookh (ɦ) 11
\hookheng (ɧ) 11
\hookleftarrow (↩) 31
\hookrevepsilon (ɜ) 11
\hookrightarrow (↪) 31
Horn, Berthold 46
\HP (⊂) 63
\Hp (□) 63
\Hplural (ı ı ı) 63
\Hplus (╋) 63
\HQ (Q) 63
\Hq (Q) 63
\Hquery (?) 63
\HR (R) 63
\Hr (⊃) 63
\HS (S) 63
\Hs (|) 63
\Hscribe (|) 63
\Hslash (/) 63
\hslash (ħ) 36
\Hsv (/) 63
\HT (=) 63
\HT (T) 49
\Ht (⌓) 63
\Hten (∩) 63
\Hthousand (|) 63
\Htongue (¬) 63
\HU (|) 63
\Hu (|) 63
Hungarian umlaut . *see* accents
\Hut (⌂) 59
\HV (|) 63
\Hv (∩) 63
\hv (ƕ) 11
\Hvbar (|) 63
\HW (|) 63
\Hw (|) 63
\HX (|) 63
\Hx (|) 63
\HXthousand (|) 63
\HY (|) 63
\Hy (|) 63
hyphen, discretionary 78
\HZ (Z) 63
\Hz (=) 63

I

\i (ı) 12
\ibar (ɨ) 11
IBM 49, 76
\IceMountain (⛰) 59
\iddots (⋰) 43, 69
\idotsint (∫ ⋯ ∫) 22
\idotsint (∫⋯∫) 24
\iff . *see* \Longleftrightarrow
ifsym (package) . 47, 54, 59, 60, 65, 79, 80
\iiiint (⨌) 22
\iiiint (⨌) 24
\iiiint (⨌) 25
\iiint (∭) 23
\iiint (∭) 22
\iiint (∭) 22, 24
\iiint (∭) 25
\iint (∬) 23
\iint (∬) 22
\iint (∬) 22, 24
\iint (∬) 25
\Im (ℑ) 35
\im (j) 36
\imath (ı) 35, 39
\impliedby *see* \Longleftarrow
\implies *see* \Longrightarrow *and* \vdash
impulse train . . . . . *see* sha
\in (∈) 36
\in (∈) 35
inches . . . . . *see* \second *and* \textquotedbl
independence
  probabilistic 68
  statistical 68
  stochastic . . . . . *see* \bot
\independent (⫫) 68
\Industry (🏭) 55
inequalities 7, 29, 30
inexact differential . . *see* \dbar
\inf (inf) 34
\Info (ℹ) 55
information symbols 55
informator symbols 60
\infty (∞) 45
\infty (∞) 44
\inipartvoice (◒) 14
\inipartvoiceless (◒) 14
\injlim (inj lim) 34
\inplus (⋵) 26
\int (∫) 23
\int (∫) 21, 22
\int (∫) 22
integers (ℤ) *see* alphabets, math
integrals 21–25, 67–68
integrals (wasysym package option) 22
\intercal (⊺) 19
\interleave (⫴) 20
intersection . . . . . *see* \cap
\Interval (◔) 60
\inva (ɐ) 11
\invamp (⅋) 20
\invdiameter (⌀) 57
\inve (ə) 11
\InversTransformHoriz (•⊸○) 27
\InversTransformVert (•/○) . 27
\invf (ʃ) 11
\invglotstop (ɞ) 11
\invh (ɥ) 11
\invlegr (ɭ) 11
\invm (ɯ) 11
\invneg (¬) 26
\invr (ɹ) 11
\invscr (ʁ) 11
\invscripta (ɒ) 11
\invv (ʌ) 11
\invw (ʍ) 11
\invy (ʎ) 11
\iota (ι) 34
\iotaup (ɩ) 35
\ipagamma (ɣ) 11
\IroningI (🖷) 58
\IroningII (🖷) 58
\IroningIII (🖷) 58
\Irritant (✕) 60
\ismodeledby (=|) 66
ISO character entities 78
isoent (package) 78

J

\j (ȷ) 12
\JackStar (✣) 53
\JackStarBold (✤) 53
Jewish star 53
\jmath (ȷ) 35, 39
\Joch (Ⅾ) 59
\Join (⋈) 25, 26
\joinrel 66
\Jupiter (♃) 48
\Jupiter (♃) 48
\jupiter (♃) 48

K

\k (◒) 12
\kappa (κ) 34
\kappaup (κ) 35
\ker (ker) 34
\Keyboard (⌨) 49
king . . . . . *see* chess symbols
knight . . . . . *see* chess symbols
Knuth, Donald E. . . . 6, 75, 81
  symbols by 55, 58
\Kr (◉) 58
\kreuz (✠) 57
\kside (≫) 60
\Kutline (┄) 51

L

\L (Ł) 8
\l (ł) 8
\labdentalnas (ɱ) 10
\labvel 14
\Ladiesroom (🚺) 55
Lagrangian ($\mathscr{L}$) . *see* alphabets, math

\Lambda (Λ) 34
\lambda (λ) 34
\lambdabar (ƛ) 44
\lambdaslash (ƛ) 44
\lambdaup (λ) 35
Lamport, Leslie 78, 81
\land . . . . . *see* \wedge
\landdownint (⨟) 25
\landupint (⨞) 25
\Langle (⪡) 46
\lAngle (⟪) 38
\langle (⟨) 19, 37
\Laplace (•—○) 27
\laplace (○—•) 27
Laplace transform (ℒ) . . . . *see* alphabets, math
Laplacian (Δ) . . . . . *see* \Delta
Laplacian (∇^2) . . . . *see* \nabla
\largepencil ( ) 51
\larrowfill 41
\Laserbeam (✷—) 50
LaTeX 1, 6, 22, 34, 37, 40, 43, 44, 51, 60, 64, 66–71, 74, 75, 78, 79, 81
LaTeX 2ε . 1, 6, 7, 17–19, 25, 28, 31, 39, 43, 44, 46, 59, 64–66, 68, 69, 73–78, 81
latexsym (package) 19, 25, 28, 31, 44, 64, 79, 80
\latfric (ɬ) 10
Latin 1 . . . . . 6, 76, 78
table 77
laundry symbols 58
\Lbag (⟅) 36
\lbag (⟅) 36
\lbbbrack (⦇) 38
\Lbrack (⦇) 46
\lBrack (⦇) 38
LCD digits 47
\lCeil (⌈) 38
\lceil (⌈) 37
\lcm (lcm) 74
\lcorners (⌜) 36
\ldotp (.) 43
\ldots (…) 43
\le . . . . . *see* \leq
\leadsto (⇝) 26, 31
leaf . . . . . *see* \textleaf
\left 37, 38
\LEFTarrow (◀) 57
\Leftarrow (⇐) 19, 31
\leftarrow (←) 32
\leftarrow (←) 31
\leftarrowtail (↢) 31
\leftarrowtriangle (⇽) . . 32
\leftbarharpoon (⥪) 33
\LEFTCIRCLE (◖) 57
\LEFTcircle (◐) 57
\Leftcircle (◑) 57
\leftharpoondown (⇁) 33
\leftharpoondown (⇁) 31
\leftharpoonup (↼) 33
\leftharpoonup (↼) 31
\leftleftarrows (⇇) 32
\leftleftarrows (⇇) 31
\leftleftharpoons (⥋) . . . 33
\leftmoon (☾) 48
\leftmoon (☾) 48
\leftp (ˊ) 15
\leftpointright (☞) 52
\Leftrightarrow (⇔) 31
\leftrightarrow (↔) 32
\leftrightarrow (↔) 31
\leftrightarroweq (⇿) 32
\leftrightarrows (⇆) 32
\leftrightarrows (⇆) 31
\leftrightarrowtriangle (⇿) 32
\leftrightharpoon (⇋) . . . 33
\leftrightharpoons (⥊) . . 33
\leftrightharpoons (⇋) . . 31
\leftrightharpoonsfill . . . 41
\leftrightsquigarrow (⭤) 32
\leftrightsquigarrow (↭) 31
\Leftscissors (⤽) 51
\leftslice (◅) 20
\leftsquigarrow (⇜) 32
\leftsquigarrow (⇜) 32
\leftt (⊣) 15
\leftthreetimes (⋋) 45
\leftthreetimes (⋋) 19
\leftthumbsdown (☟) 52
\leftthumbsup (☝) 52
\lefttorightarrow (⮌) . . . 32
\Lefttorque (ϟ) 49
\leftturn (↺) 57
legal symbols 7, 17, 77
\legm (ɯ) 10
\legr (ɾ) 10
\length (ː) 15
\Leo (♌) 48
\leo (♌) 48
\leq (⩽) 30
\leq (≤) 29, 30
\leqq (≦) 30
\leqq (≦) 29
\leqslant (⩽) 29
less-than signs . . *see* inequalities
\lessapprox (⪅) 30
\lessapprox (⪅) 29
\lessdot (⋖) 30
\lessdot (⋖) 29
\lesseqgtr (⋚) 30
\lesseqgtr (⋚) 29
\lesseqqgtr (⪋) 30
\lesseqqgtr (⪋) 29
\lessgtr (≶) 30
\lessgtr (≶) 29
\lesssim (≲) 30
\lesssim (≲) 29
\Letter (✉) 60
\Letter (✉ vs. ✉) 65
\Letter (✉) 49
letter-like symbols 35, 36
letters . . . . . *see* alphabets
barred 66
non-ASCII 8
slashed 67
variant Latin 35
\LF (◙) 49
\lfilet ( ) 38
\lFloor (⦋) 38
\lfloor (⌊) 37
\lg (lg) 34
\lgroup ( ) 37
\LHD (◀) 20
\lhd (◁) 19, 20
\lhdbend ( ) 55
\Libra (♎) 48
\libra (♎) 48
\lightbulb (♁) 73
lightbulb.map (file) 79
lightbulb.mf (file) . . 71, 72, 79
lightbulb.sty (file) . . . 73, 74
lightbulb10.2602gf (file) . . 71
lightbulb10.dvi (file) 71
lightbulb10.mf (file) 71–73, 79
lightbulb10.tfm (file) 73
\Lightning (ϟ vs.) 65
\Lightning (ϟ) 49
\Lightning ( ) 59
\lightning (↯) 32
\lightning (↯ vs. ϟ) 65
\lightning (ϟ) 57
\lim (lim) 34, 74
\liminf (lim inf) 34, 75
limits 34
\limsup (lim sup) 34, 75
linear implication *see* \multimap
\Lineload (⫛) 49
linguistic symbols 9–12
\lJoin (⋉) 26
\ll (≪) 30
\ll (≪) 29
\llap 68
\llbracket (⟦) 37
\llceil (⌈) 36
\llcorner (⌞) 36
\llcorner (⌞) 36
\llcurly (⋘) 27
\Lleftarrow (⇚) 31
\llfloor (⌊) 36
\lll (⋘) 30
\lll (⋘) 29
\lll (⋘ vs. ⩽) 65
\llless . . . . . *see* \lll
\llparenthesis (⦅) 36
\lmoustache ( ) 37
\ln (ln) 34
\lnapprox (⪉) 30
\lnapprox (⪉) 29
\lneq (⪇) 30

\lneq (≨) 29
\lneqq (≨) 30
\lneqq (≨) 29
\lnot . . . . . *see* \neg
\lnsim (⋦) 30
\lnsim (⋦) 29
local ring (𝔒) . . *see* alphabets, math
\log (log) 34, 74
log-like symbols 34, 75
logical operators
and . . . . . *see* \wedge
not . . . *see* \neg *and* \sim
or . . . . . *see* \vee
\logof (⊛) 26
lollipop . . . . . *see* \multimap
long division 40
longdiv (package) 40
\Longleftarrow (⟸) 31
\longleftarrow (⟵) 31
\Longleftrightarrow (⟺) 31, 59
\longleftrightarrow (⟷) 31
\Longmapsfrom (⟽) 32
\longmapsfrom (⟻) 32
\Longmapsto (⟾) 32
\longmapsto (⟼) 31
\LongPulseHigh (⎍) 47
\LongPulseLow (⎌) 47
\Longrightarrow (⟹) 31
\longrightarrow (⟶) 31
\looparrowdownleft (↫) . . 32
\looparrowdownright (↬) . . 32
\looparrowleft (↫) 32
\looparrowleft (↫) 31
\looparrowright (↬) 32
\looparrowright (↬) 31
\Loosebearing (≗) 49
\lor . . . . . *see* \vee
\LowerDiamond (⬙) 54
lowering . . . *see* \textlowering
\lozenge (◊) 44
\Lparen (⦅) 46
\lrcorner (⌟) 36
\lrcorner (⌟) 36
\lrJoin . . . . . *see* \Join
\lrtimes (⋈) 26
\Lsh (↰) 32
\Lsh (↰) 31
\Lsteel (⅃) 49
\ltimes (⋉) 21
\ltimes (⋉) 19
\ltriple 38
Luecking, Dan 68
\lVert (‖) 37
\lVert (‖) 38
\lvert (|) 37
\lvertneqq (≨) 30
\lvertneqq (≨) 29
\lz (ƛ) 10

M

\M 8
\M (ᴍ) 61
\m 8
\m (ₘ) 61
\ma (m̄) 61
macron . . . . . *see* accents
\macron (m̄) 15
majuscules 34
\makeatletter 69
\makeatother 69
\MALE (⚂) 50
\Male (⚂) 50
\male (♂) 50
\MaleMale (⚣) 50
\maltese (✠) 7
\manboldkidney (⬭) 58
\manconcentriccircles (◎) 58
\manconcentricdiamond (◈) 58
\mancone (♢) 58
\mancube (⬚) 58
\manerrarrow (↯) 58
\manfilledquartercircle (◣) 58
manfnt (package) . 55, 58, 79, 80
\manhpennib (▂) 58
\manimpossiblecube (⬚) . . . 58
\mankidney (⬭) 58
\manlhpenkidney (⬭) 58
\manpenkidney (⬭) 58
\manquadrifolium (✿) 58
\manquartercircle (◝) 58
\manrotatedquadrifolium (✿) 58
\manrotatedquartercircle (◜) 58
\manstar (☆) 58
\mantiltpennib (▰) 58
\mantriangledown (▼) 58
\mantriangleright (▶) 58
\mantriangleup (▲) 58
\manvpennib (▮) 58
\Mappedfromchar (ꟽ) 33
\mappedfromchar (ꟽ) 33
\Mapsfrom (⇐|) 32
\mapsfrom (↤) 32
\Mapsfromchar (ꟽ) 33
\Mapsfromchar (ꟽ) 33
\mapsfromchar (ꟽ) 33
\mapsfromchar (ꟽ) 33
\Mapsto (|⇒) 32
\mapsto (↦) 31
\Mapstochar (ꟽ) 33
\Mapstochar (ꟽ) 33
\mapstochar (ꟽ) 33
\markera (✕) 60
\markerb (○) 60
married . . . . . *see* \textmarried
\Mars (♂) 48
\Mars (♂) 48
\mars (♂) 48
\MartinVogel (𝔐) 59
marvosym (package) 16, 44, 48–51, 55, 58, 59, 65
matbbol (package) 46
\mate (#) 60
material biconditional . . . . . *see* \leftrightarrow *and* \equiv
material conditional . . . . . *see* \rightarrow *and* \supset
material equivalence . . . . . *see* \leftrightarrow *and* \equiv
material implication . . . . . *see* \rightarrow *and* \supset
math alphabets 46
math-text 19
mathabx (package) 21, 23, 25, 27, 28, 30, 32, 33, 36–39, 42, 43, 45, 48, 55, 64, 65, 79, 82
\mathaccent 66, 67
\mathbb 46
\mathbbm 46
\mathbbmss 46
\mathbbmtt 46
mathbbol (package) 46
\mathbf 75
\mathbin 74
\mathbold 75
mathcal (euscript package option) 46
\mathcal 46
\mathcent (¢) 36
\mathchoice 67, 68
\mathclose 74
mathcomp (package) 43
\mathdollar ($) 19
mathdots (package) 43, 69, 79, 80
\mathds 46
\mathellipsis (…) 19
mathematical symbols . . 19–46
\mathfrak 46
\mathit 46
\mathnormal 46
\mathop 74
\mathopen 74
\mathord 74
\mathpalette 68
\mathparagraph (¶) 19
\mathpunct 74
\mathpzc 46
\mathrel 66, 74
\mathring (m̊) 39
\mathrm 46
mathrsfs (package) 46, 79
mathscr (euscript package option) 46
\mathscr 46
\mathsection (§) 19
\mathsterling (£) 19, 36
\mathunderscore (_) 19
\max (max) 34
Maxwell-Stefan diffusion coefficient . . . . . *see* \DH
\maya 43
\Mb (ᵯ) 61

\mb (⍨) 61
\Mbb (𝔐) 61
\mBb (𝔪) 61
\mbB (𝔐) 61
\mbb (𝔪) 61
mbboard (package) 46, 79
\mbbx (𝔪) 61
\mbox 68
\measuredangle (⦟) 45
\measuredangle (∡) 44
mechanical scaling 71, 73
\medbullet (●) 20
\medcirc (○) 20
\Mercury (☿) 48
\Mercury (☿) 48
\mercury (☿) 48
\merge (⩓) 20
METAFONT 46, 71–74
METAFONTbook symbols . . . 58
metre (package) 15, 39, 61, 79, 80
metre 61
metrical symbols 61
\mho (℧) 44
micro . . . . . *see* \textmu
\micro (µ) 47
Microsoft Windows 78
\mid (∣) 25
\middle 37
\midtilde (~) 15
\min (min) 34, 74
minus . . . . . *see* \textminus
\minuso (⊖) 20
minutes, angular . . . *see* \prime
miscellaneous symbols . . 44, 45, 56–63
"Missing $ inserted" 19
\Mmappedfromchar (⫫) 33
\mmappedfromchar (⫫) 33
\Mmapstochar (⫬) 33
\mmapstochar (⫬) 33
\Mobilefone (📱) 49
\mod 34
\models (⊨) 25, 66
moduli space . . . *see* alphabets, math
monetary symbols 16, 46
\moo (⚮) 20
\Moon (☾) 48
\Moon (☽) 48
\morepawns (▷) 60
\moreroom (◯) 60
\Mountain (▲) 59
mouse . . . . *see* \ComputerMouse
\MoveDown (▼) 58
\moverlay 69
\MoveUp (▲) 58
\mp (∓) 19
\mu (μ) 34
\multimap (⊸) 25, 26
\multimapboth (⧟) 26
\multimapbothvert (⧳) 26
\multimapdot (⊸) 26
\multimapdotboth (⧟) 26
\multimapdotbothA (⧟) . . . 26
\multimapdotbothAvert (⧳) . 26
\multimapdotbothB (⧟) . . . 26
\multimapdotbothBvert (⧳) . 26
\multimapdotbothvert (⧳) . . 26
\multimapdotinv (⟜) 26
\multimapinv (⟜) 26
multiple accents per character 69
\Mundus (🜨) 59
musical symbols . 18, 44, 57, 58
musixtex (package) 57, 58
\muup (µ) 35
\MVAt (@) 59
\MVEight (8) 44
\MVFive (5) 44
\MVFour (4) 44
\MVNine (9) 44
\MVOne (1) 44
\MVSeven (7) 44
\MVSix (6) 44
\MVThree (3) 44
\MVTwo (2) 44
\MVZero (0) 44

N

\nabla (∇) 44
\NAK (§) 49
\napprox (≉) 27
\napproxeq (≋) 26
\nasymp (≭) 26
nath (package) 36, 38, 79
\natural (♮) 44, 57
natural numbers (ℕ) . . . . . *see* alphabets, math
navigation symbols 58
\nbacksim (⍲) 26
\nbacksimeq (≠) 26
\nBumpeq (≠) 26
\nbumpeq (≠) 26
\ncong (≇) 27
\ncong (≇) 26
\ncurlyeqprec (⋞) 27
\ncurlyeqsucc (⋟) 27
\nDashV (⊯) 27
\nDashv (⊭) 27
\ndashV (⊮) 27
\ndashv (⊬) 27
\ndashVv (⊮) 27
\ne . . . . . *see* \neq
\Nearrow (⇗) 32
\nearrow (↗) 32
\nearrow (↗) 31, 68, 69
\neg (¬) 44
negation . . . *see* \neg *and* \sim
\Neptune (♆) 48
\Neptune (♆) 48
\neptune (♆) 48
\neq (≠) 27
\neq (≠) 29
\neqslantgtr (⩌) 30
\neqslantless (⩋) 30
\nequiv (≢) 26
\neswarrow (↙) 68, 69
\Neutral (○) 50
\newmoon (●) 48
\newmoon (●) 48
\newtie (■) 12
\nexists (∄) 36
\nexists (∄) 36
\NG (Ŋ) 8
\ng (ŋ) 8
\ngeq (≱) 30
\ngeq (≱) 29, 30
\ngeqq (≧̸) 30
\ngeqq (≧̸) 29
\ngeqslant (⩾̸) 29
\ngg (⋙̸) 29
\ngtr (≯) 30
\ngtr (≯) 29
\ngtrapprox (⪊) 30
\ngtrapprox (⪊) 29
\ngtrless (≹) 29
\ngtrsim (≵) 30
\ngtrsim (≵) 29
\ni (∋) 35
\nialpha (α) 11
\nibar . . . . . *see* \ownsbar
\nibeta (β) 11
\NibLeft (🜲) 52
\NibRight (🜳) 52
nibs 52
\NibSolidLeft (🜴) 52
\NibSolidRight (🜵) 52
nicefrac (package) . . . 45, 79, 80
\nichi (χ) 11
\niepsilon (ε) 11
\nigamma (γ) 11
\niiota (ι) 11
\nilambda (λ) 11
\niomega (ω) 11
\niphi (ϕ) 11
\niplus (∋) 26
\nisigma (σ) 11
\nitheta (θ) 11
\niupsilon (υ) 11
\niv (∟) 36
\nj (ȷ) 11
\nLeftarrow (⇍) 32
\nLeftarrow (⇍) 31
\nleftarrow (↚) 32
\nleftarrow (↚) 31
\nLeftrightarrow (⇎) 32
\nLeftrightarrow (⇎) 31
\nleftrightarrow (↮) 32
\nleftrightarrow (↮) . 19, 31
\nleq (≰) 30
\nleq (≰) 29, 30
\nleqq (≦̸) 30
\nleqq (≦̸) 29
\nleqslant (⩽̸) 29
\nless (≮) 30
\nless (≮) 29
\nlessapprox (⪉) 30

\nlessapprox (⪅̸) 29
\nlessgtr (≸) 29
\nlesssim (≴) 30
\nlesssim (⋦̸) 29
\nll (≪̸) 29
\nmid (∤) 26
\nnearrow (↗̸) 32
\nnwarrow (↖̸) 32
\NoBleech (⏦) 58
\NoChemicalCleaning (⍉) . . 58
nointegrals (wasysym package option) 22
\NoIroning (⏥) 58
non-commutative division . . 43
norm . . *see* \lVert *and* \rVert
\NoSun (●) 59
not . . . . . *see* \neg
\not 27
not equal (≠ vs. ≒) 27
\notasymp (≭) 27
\notbackslash (⍀) 49
\notbot (⫮) 36
\notdivides (∤) 27
\notequiv (≢) 27
\notin (∉) 36
\notin (∉) 36
\notni (∌) 36
\notowner (∌) 36
\notowns . . *see* \notowner *and* \notni
\notperp (⫬) 27
\notslash (⌿) 49
\nottop (⫫) 36
\NoTumbler (⍁) 58
\novelty (N) 60
\nparallel (∦) 26
\nplus (⨣) 20
\nprec (⊀) 27
\nprec (⊀) 26
\nprecapprox (⪹̸) 27
\nprecapprox (⪹̸) 26
\npreccurlyeq (⋠) 27
\npreccurlyeq (⋠) 26
\npreceq (⪯̸) 27
\npreceq (⪯̸) 26
\npreceqq (⪵̸) 26
\nprecsim (⋨) 27
\nprecsim (⋨) 26
\nRightarrow (⇏) 32
\nRightarrow (⇏) 31
\nrightarrow (↛) 32
\nrightarrow (↛) 31
\nshortmid (∤) 26
\nshortparallel (∦) 26
\nsim (≁) 27
\nsim (≁) 26
\nsimeq (≄) 27
\nsimeq (≄) 26
\nsqSubset (⋢) 28
\nsqsubset (⋤) 28
\nsqsubset (⊏̸) 28
\nsqsubseteq (⋣) 28
\nsqsubseteq (⋢) 28
\nsqsubseteqq (⫋̸) 28
\nsqSupset (⋣) 28
\nsqsupset (⋥) 28
\nsqsupset (⊐̸) 28
\nsqsupseteq (⋥) 28
\nsqsupseteq (⋣) 28
\nsqsupseteqq (⫌̸) 28
\nSubset (⋐̸) 28
\nSubset (⋐̸) 28
\nsubset (⊄) 28
\nsubseteq (⊈) 28
\nsubseteq (⊈) 28
\nsubseteqq (⫅̸) 28
\nsubseteqq (⫅̸) 28
\nsucc (⊁) 27
\nsucc (⊁) 26
\nsuccapprox (⪺̸) 27
\nsuccapprox (⪺̸) 26
\nsuccurlyeq (⋡) 27
\nsuccurlyeq (⋡) 26
\nsucceq (⪰̸) 27
\nsucceq (⪰̸) 26
\nsucceqq (⪶̸) 26
\nsuccsim (⋩) 27
\nsuccsim (⋩) 26
\nSupset (⋑) 28
\nSupset (⋑) 28
\nsupset (⊅) 28
\nsupseteq (⊉) 28
\nsupseteq (⊉) 28
\nsupseteqq (⫆̸) 28
\nsupseteqq (⫆̸) 28
ntheorem (package) 44
\nthickapprox (≉) 26
\ntriangleleft (⋪) 30
\ntriangleleft (⋪) 30
\ntrianglelefteq (⋬) 30
\ntrianglelefteq (⋬) 30
\ntrianglelefteqslant (⋬) 30
\ntriangleright (⋫) 30
\ntriangleright (⋫) 30
\ntrianglerighteq (⋭) 30
\ntrianglerighteq (⋭) 30
\ntrianglerighteqslant (⋭) 30
\ntwoheadleftarrow (↞̸) . . . 26
\ntwoheadrightarrow (↠̸) . . 26
\nu (ν) 34
null set 44, 45
number . . . . . *see* \textnumero
number sets *see* alphabets, math
numbers . . . . . *see* digits
\nuup (ν) 35
\nvargeq (≥⃒) 30
\nvarleq (≤⃒) 30
\nvarparallel (∥⃒) 26
\nvarparallelinv (⫲⃒) 26
\nVDash (⊯) 27
\nVDash (⊭) 26
\nVdash (⊮) 27
\nVdash (⊬) 26
\nvDash (⊭) 27
\nvDash (⊭) 26
\nvdash (⊬) 27
\nvdash (⊬) 26
\nVvash (⊮) 27
\Nwarrow (⇖̸) 32
\nwarrow (↖̸) 32
\nwarrow (↖̸) 31, 68
\nwsearrow (↖̸) 68

O

\O (Ø) 8
\o (ø) 8
o (*o*) 34
\oasterisk (⊛) 21
\obackslash (⦸) 21
\obar (⦶) 20
\Obelus (⨷) 61
\obelus (⨷) 61
\Obelus* (⨸) 61
\obelus* (⨸) 61
\oblong (⌺) 20
\obot (⦺) 21
\obslash (⦸) 20
\ocirc (⊚) 21
\ocircle (⦾) 20
\ocoasterisk (⊛) 21
\octagon (⯃) 54
\Octosteel (●) 49
\od (◙) 14
\odiv (⨸) 21
\odot (⊙) 21
\odot (⊙) 19
\odplus (⦹) 21
\OE (Œ) 8
\oe (œ) 8
\officialeuro (€) 16
\offinterlineskip 67
ogonek . . . . . *see* accents
\ogreaterthan (⧁) 20
\ohill (◚) 14
ohm . . . . . *see* \textohm
\ohm (Ω) 47
\Ohne (◭) 58
\OHORN (Ơ) 8
\ohorn (σ) 8
\oiiint (∰) 24
\oiiintclockwise (∰) 24
\oiiintctrclockwise (∰) . 24
\oiint (∯) 23
\oiint (∯) 22, 24
\oiint (∯) 25
\oiintclockwise (∯) 24
\oiintctrclockwise (∯) . . 24
\oint (∮) 23
\oint (∮) 21
\ointclockwise (∲) 24
\ointclockwise (∲) 25
\ointctrclockwise (∮) 24
\ointctrclockwise (∲) 25
old-style digits 17
\oldstylenums 17
\oleft (⦵) 21

\olessthan (⩽) 20
\Omega (Ω) 34
\omega (ω) 34
\omegaup (ω) 35
\ominus (⊖) 21
\ominus (⊖) 19
\onlymove (□) 60
\oo (∞) 61
\oo (∞) 11
\open (̥) 15
\openJoin (⋎) 26
\openo (ɔ) 11
\openo (ɔ) 11
\openo (ɔ) 11
\opentimes (⋉) 26
operators
  binary 19–21
  logical *see* logical operators
  set . . . . . *see* set operators
\oplus (⊕) 21
\oplus (⊕) 19, 64
\opposbishops (□■) 60
\opposition (♂♀) 48
optical scaling 71
options . . . *see* package options
or . . . . . *see* \vee
\oright (⊕) 21
\OrnamentDiamondSolid (❖) 56
orthogonal to . . . . . *see* \bot
\oslash (⊘) 21
\oslash (⊘) 19
\otimes (⊗) 21
\otimes (⊗) 19
\otop (⊕) 21
\otriangleup (⟑) 21
ovals 55
\ovee (⩒) 20
\overarc (■) 15
\overbrace (■) 42
\overbrace (■) 40
\overbracket (■) 41
\overbracket (■) 69, 70
\overbridge (■) 14
\overgroup (■) 42
\overleftarrow (■) 40
\overleftrightarrow (■) . 40
\overline (■) 19, 40
\overparenthesis (■) . 69, 70
\Overrightarrow (■) 40
overrightarrow (package) . 40, 79
\overrightarrow (■) 40
\overring (˚) 15
\ovoid (○) 21
\owedge (⩓) 20
\owns . . . . . *see* \ni
\owns (∋) 36
\ownsbar (⫋) 36

P

\P (¶) 7, 77
\p (.) 61
\p@ 69
package options
  a (esvect) 42
  bbgreekl (mathbbol) . . . 46
  b (esvect) 42
  c (esvect) 42
  d (esvect) 42
  e (esvect) 42
  f (esvect) 42
  g (esvect) 42
  h (esvect) 42
  integrals (wasysym) 22
  mathcal (euscript) 46
  mathscr (euscript) 46
  nointegrals (wasysym) . . 22
  sans (dsfont) 46
  varg (txfonts/pxfonts) . . 35
packages
  accents 69, 79, 80
  amsbsy 75
  amsfonts 19, 25, 28, 31, 44, 46
  amsmath 6, 34, 74
  amssymb . 6, 19, 25, 28, 31, 44, 46, 79, 80, 82
  amstext 67, 68
  arcs 15, 79, 80
  ar 47, 79
  ascii 49, 76, 79
  bbding 51–53, 55, 56, 65, 79, 80
  bbm 46, 79
  bbold 46, 79
  bm 75, 79, 80
  braket 37
  calrsfs 46
  cancel 40
  cclicenses 17, 79, 80
  chemarrow 33, 41, 79
  chemarr 41, 79, 80
  dblaccnt 69
  dictsym 63, 79, 80
  dingbat 51, 52, 56, 65, 79, 80
  dsfont 46, 79
  empheq 41, 79, 80
  esint 25, 79
  esvect 42, 79
  eufrak 46
  eurosym 16, 79, 80
  euscript 46, 79, 80
  extarrows 42, 79, 80
  extraipa 14, 79
  fclfont 79
  fc 8, 12
  fixmath 75
  fontenc 6, 8, 12, 76
  gensymb 47
  graphics 66
  graphicx 15, 66
  harmony 57, 58, 79, 80
  hieroglf 63, 79, 80
  holtpolt 43, 79
  ifsym 47, 54, 59, 60, 65, 79, 80
  isoent 78
  latexsym . 19, 25, 28, 31, 44, 64, 79, 80
  manfnt 55, 58, 79, 80
  marvosym 16, 44, 48–51, 55, 58, 59, 65
  matbbol 46
  mathabx . 21, 23, 25, 27, 28, 30, 32, 33, 36–39, 42, 43, 45, 48, 55, 64, 65, 79, 82
  mathbbol 46
  mathcomp 43
  mathdots . . . 43, 69, 79, 80
  mathrsfs 46, 79
  mbboard 46, 79
  metre . . . 15, 39, 61, 79, 80
  musixtex 57, 58
  nath 36, 38, 79
  nicefrac 45, 79, 80
  ntheorem 44
  overrightarrow 40, 79
  phaistos 62, 79, 80
  phonetic 11, 14, 66, 79
  pifont . 8, 51–56, 64, 79, 80
  polynom 40
  protosem 62, 79, 80
  psnfss 53
  pxfonts 19, 20, 24–26, 28, 29, 31–33, 35, 36, 44, 46, 64, 76
  rotating 17
  semtrans . . . 12, 15, 79, 80
  skak 60, 79, 80
  skull 55, 79, 80
  slashed 67
  stmaryrd . 20, 22, 26, 28, 30, 32, 33, 36, 37, 65, 78–80
  t4phonet . . . 12, 15, 79, 80
  t5 79
  textcomp 6, 7, 12, 16–18, 31, 39, 45, 47, 57, 64, 76, 78–80
  timing 47
  tipa 9, 10, 12, 14, 15, 66, 79, 80
  tipx 10, 79, 80
  trfsigns 27, 36, 39, 79
  trsym 27, 79, 80
  txfonts 19, 20, 24–26, 28, 29, 31–33, 35, 36, 44, 46, 64, 66, 76, 79, 80
  ulsy 21, 33, 79
  underscore 7
  undertilde 42, 79, 80
  units 45
  universa 55, 59, 79, 80
  upgreek 35, 79, 80
  upquote 76
  url 76
  vntex 8, 12
  wasysym . 11, 16, 18–20, 22, 25, 26, 28, 29, 31, 44, 47–50, 53, 54, 57, 65, 79, 80

wsuipa 10, 14, 15, 65, 66, 69, 79, 80
yfonts 46, 79, 80
yhmath 39, 40, 42, 43, 69, 79
zapfchan 79
longdiv 40
Pakin, Scott 1, 78
\PaperLandscape (▭) 60
\PaperPortrait (▯) 60
par . . . . . *see* \invamp
paragraph mark . . . . . *see* \P
parallel . *see also* \varparallel
\parallel (∥) 25
\ParallelPort (▭) 49
\partial (∂) 36
\partial (𝜕) 35
\partialslash (�202) 36
parts per thousand . . . . . *see* \textperthousand
\partvoice (■) 14
\partvoiceless (■) 14
\passedpawn (♘) 60
pawn . . . . . *see* chess symbols
\Peace (✌) 56
\PencilLeft (✏) 52
\PencilLeftDown (✏) 52
\PencilLeftUp (✎) 52
\PencilRight (✏) 52
\PencilRightDown (✎) 52
\PencilRightUp (✏) 52
pencils 51, 52
\pentagon (⬠) 54
percent sign . . . . . *see* \%
\permil (‰) 18
\Perp (⫫) 26
\perp (⊥) 25, 68
\perthousand (‰) 47
\Pfund (℔) 16
phaistos (package) . . . 62, 79, 80
Phaistos disk 62
pharmaceutical prescription *see* \textrecipe
\PHarrow (𐘚) 62
\PHbee (𐘛) 62
\PHbeehive (𐘜) 62
\PHboomerang (𐘝) 62
\PHbow (𐘞) 62
\PHbullLeg (𐘟) 62
\PHcaptive (𐘠) 62
\PHcarpentryPlane (𐘡) . . . 62
\PHcat (𐘢) 62
\PHchild (𐘣) 62
\PHclub (𐘤) 62
\PHcolumn (𐘥) 62
\PHcomb (𐘦) 62
\PHdolium (𐘧) 62
\PHdove (𐘨) 62
\PHeagle (𐘩) 62
\PHflute (𐘪) 62
\PHgaunlet (𐘫) 62
\PHgrater (𐘬) 62
\PHhelmet (𐘭) 62
\PHhide (𐘮) 62
\PHhorn (𐘯) 62
\Phi (Φ) 34
\phi (𝜙) 34
\phiup (ϕ) 35
\PHlid (𐘰) 62
\PHlily (𐘱) 62
\PHmanacles (𐘲) 62
\PHmattock (𐘳) 62
\Phone (☎) 56
\phone (☎) 57
\PhoneHandset (✆) 56
phonetic (package) 11, 14, 66, 79
phonetic symbols 9–12
\photon (〰) 47
\PHoxBack (𐘴) 62
\PHpapyrus (𐘵) 62
\PHpedestrian (𐘶) 62
\PHplaneTree (𐘷) 62
\PHplumedHead (𐘸) 62
\PHram (𐘹) 62
\PHrosette (𐘺) 62
\PHsaw (𐘻) 62
\PHshield (𐘼) 62
\PHship (𐘽) 62
\PHsling (𐘾) 62
\PHsmallAxe (𐘿) 62
\PHstrainer (𐙀) 62
\PHtattooedHead (𐙁) 62
\PHtiara (𐙂) 62
\PHtunny (𐙃) 62
\PHvine (𐙄) 62
\PHwavyBand (𐙅) 62
\PHwoman (𐙆) 62
physical symbols 47
\Pi (Π) 34
\pi (𝜋) 34
\Pickup (℗) 49
pifont (package) 8, 51–56, 64, 79, 80
pilcrow . . . . . *see* \P
pipe . . . . . *see* \textpipe
\Pisces (♓) 48
\pisces (♓) 48
\Pisymbol 64
\pitchfork (⋔) 45
\pitchfork (⋔) 25
\piup (π) 35
\planck (ℎ) 11
\Plane (✈) 56
planets 48
playing cards . . . . *see* card suits
\Plus (✚) 52
plus-or-minus sign . . . . *see* \pm
\PlusCenterOpen (✜) 52
\pluscirc (⊕) 21
\PlusOutline (✙) 52
plusses 52
\PlusThinCenterOpen (✛) . . 52
\Pluto (♇) 48
\Pluto (♇) 48
\pluto (♇) 48
\pm (±) 19
\pm (𝜌) 61
\pmb 75
\pmod 34
\pod 34
\pointer (✇) 57
\Pointinghand (☞) 55
\polishhook (̨) 15
\polter (👻) 43
polygons 54
polynom (package) 40
polynomial division 40
PostScript fonts . 16, 35, 46, 51, 53, 64, 73, 74
\pounds (£) 7, 77, 78
power set (𝒫) . . *see* alphabets, math
\Pp (⁚) 61
\pp (⁚) 61
\ppm (‱) 61
\Ppp (⁝) 61
\ppp (⁝) 61
\Pppp (⁞) 61
\pppp (⁞) 61
\Ppppp (⁞) 61
\ppppp (⁞) 61
\Pr (Pr) 34
\prec (≺) 25
\precapprox (⪷) 27
\precapprox (⪷) 25
\preccurlyeq (≼) 27

\preccurlyeq (≼) 25
\precdot (⋖) 27
\preceq (⪯) 25
\preceqq (⪳) 26
\precnapprox (⪹) 27
\precnapprox (⪹) 26
\precneq (⪱) 27
\precneqq (⪵) 26
\precnsim (⋨) 27
\precnsim (⋩) 26
\precsim (≾) 27
\precsim (≾) 25
prescription . . *see* \textrecipe
\prime (′) 44
\Printer (🖷) 49
probabilistic independence . . 68
\prod (∏) 21
\projlim (proj lim) 34
pronunciation symbols . . . . *see* phonetic symbols
proof, end of 44
\propto (∝) 45
\propto (∝) 25
proto-Semitic symbols 62
protosem (package) . . 62, 79, 80
\ProvidesPackage 78
\ps (␣) 61
\Psi (Ψ) 34
\psi (ψ) 34
\psiup (ψ) 35
psnfss (package) 53
\Pu (·) 57
pulse diagram symbols 47
\PulseHigh (⎍) 47
\PulseLow (⎎) 47
punctuation 8
\pwedge (∧) 11
pxfonts (package) 19, 20, 24–26, 28, 29, 31–33, 35, 36, 44, 46, 64, 76
\Pxp (:) 61
\pxp (:) 61

Q

Q.E.D. 44
\qside (≪) 60
\Quadrad (⟦) 39
\quadrad (𝕀) 39
\Quadras (⟦) 39
\quadras (𝕀) 39
\quarternote (♩) 57
quaternions (ℍ) *see* alphabets, math
queen . . . . . *see* chess symbols
\quotedblbase („) 8
\quotesinglbase (‚) 8

R

\R (∼) 61
\r (̊) 12
\r (∼) 61
\Radiation (☢) 60
radicals . . *see* \sqrt *and* \surd
\Radioactivity (☢) 50
\Rain (⛆) 59
\RainCloud (🌧) 59
raising . . . . . *see* \textraising
\RaisingEdge (⌐) 47
\Rangle (⟫) 46
\rAngle (⟫) 38
\rangle (⟩) 19, 37
\rarrowfill 41
rational numbers (ℚ) . . . . . *see* alphabets, math
rationalized Planck constant *see* \hbar
\Rbag (⟆) 36
\rbag (⟆) 36
\rbbbrack (⟧) 38
\Rbrack (⟧) 46
\rBrack (⟧) 38
\rc (̧) 14
\rCeil (⟧) 38
\rceil (⌉) 37
\rcorners (⌝) 36
\Re (ℜ) 35
README (file) 79
real numbers (ℝ) *see* alphabets, math
recipe . . . . . *see* \textrecipe
\recorder (℗) 57
\Rectangle (▌) 55
\RectangleBold (▉) 55
rectangles 55
\RectangleThin (▏) 55
\Rectpipe (▯) 49
\Rectsteel (■) 49
reduced quadrupole moment *see* \rqm
\reflectbox 66
registered trademark . . . . . *see* \textregistered
relational symbols 25
binary 25–30
negated binary 26, 27
triangle 30
\Relbar (=) 33, 66
\relbar (−) 33, 66
\Respondens (∼) 61
\respondens (∼) 61
\restoresymbol 64
\restriction . . . . . *see* \upharpoonright
\restriction (↾) 32
retracting *see* \textretracting
return . . . . . *see* carriage return
\revD (ↁ) 11
\revddots (⋰) 69
\reve (ɘ) 11
\reveject (ɾ) 11
\revepsilon (ɜ) 11, 66
reverse solidus . . . . . *see* \textbackslash
reversed symbols 66
\reversedvideodbend (🙾) . 55
\revglotstop (ʕ) 11
\Rewind (◀) 58
\RewindToIndex (⏮) 58
\RewindToStart (⏮) 58
\rfilet (𝅘𝅥) 38
\rFloor (⟧) 38
\rfloor (⌋) 37
\rgroup (⎭) 37
\RHD (►) 20
\rhd (▷) 19, 20
\rho (ρ) 34
\rhoup (ρ) 35
\right 37, 38
\RIGHTarrow (►) 57
\Rightarrow (⇒ vs. ➔ vs. ⇒) 65
\Rightarrow (⇒) . . . 19, 31, 59
\Rightarrow (➔) 59
\rightarrow (→) 32
\rightarrow (→) 31
\rightarrowtail (↣) 31
\rightarrowtriangle (⇾) . . 32
\rightbarharpoon (⇀) 33
\RIGHTCIRCLE (◗) 57
\RIGHTcircle (◑) 57
\Rightcircle (◗) 57
\RightDiamond (◆) 54
\rightharpoondown (⇁) . . . 33
\rightharpoondown (⇁) . . . 31
\rightharpoonup (⇀) 33
\rightharpoonup (⇀) 31
\rightleftarrows (⇄) 32
\rightleftarrows (⇄) 31
\rightleftharpoon (⇌) . . . 33
\rightleftharpoons (⇌) . . 33
\rightleftharpoons (⇌) . . 31
\rightleftharpoons (⇌) . . 31
\rightleftharpoonsfill . . . 41
\rightmoon (☽) 48
\rightmoon (☽) 48
\rightp (˃) 15
\rightpointleft (☜) 52
\rightpointright (☞) . . . 52
\rightrightarrows (⇉) . . . 32
\rightrightarrows (⇉) . . . 31
\rightrightharpoons (⥤) . . 33
\Rightscissors (✂) 51
\rightslice (▷) 20
\rightsquigarrow (⇝) . . . 32
\rightsquigarrow (⇝) 31
\rightt (⊢) 15
\rightthreetimes (⋌) 45
\rightthreetimes (⋌) 19
\rightthumbsdown (👎) . . . 52
\rightthumbsup (👍) 52
\righttoleftarrow (↜) . . . 32
\Righttorque (⤾) 49
\rightturn (↻) 57
\ring (̊) 39
ring equal to . . . . . *see* \circeq

ring in equal to ... *see* \eqcirc
\riota (ɪ) ... 11
\rip (⨮) ... 55
\risingdotseq (≓) ... 27
\risingdotseq (≓) ... 25
\rJoin (⋊) ... 26
\rlap ... 54, 68
\rmoustache ( ) ... 37
rook ... *see* chess symbols
roots ... *see* \sqrt
\rotatebox ... 15, 66
rotated symbols ... 15, 66
rotating (package) ... 17
\rotm (ɯ) ... 11
\rotOmega (ʊ) ... 11
\rotr (ɹ) ... 11
\rotvara (ɒ) ... 11
\rotw (ʍ) ... 11
\roty (ʎ) ... 11
\RoundedLsteel (⊤) ... 49
\RoundedTsteel (⊥) ... 49
\RoundedTTsteel (I) ... 49
\Rparen (⦆) ... 46
\rqm (⨍) ... 67
\rrbracket (⟧) ... 37
\rrceil (⌉) ... 36
\rrfloor (⌋) ... 36
\Rrightarrow (⇛) ... 32
\rrparenthesis (⦆) ... 36
\RS (▲) ... 49
\Rsh (↱) ... 32
\Rsh (↱) ... 31
\rtimes (⋊) ... 21
\rtimes (⋊) ... 19
\rtriple ... 38
\rVert (‖) ... 38
\rVert (‖) ... 37
\rvert (|) ... 37

S

\S (§) ... 7, 77
safety-related symbols ... 50
\Sagittarius (♐) ... 48
\sagittarius (♐) ... 48
\samebishops (▞) ... 60
sans (dsfont package option) ... 46
\satellitedish (📡) ... 56
\Saturn (♄) ... 48
\Saturn (♄) ... 48
\saturn (♄) ... 48
\savesymbol ... 64
\Sborder (🖽) ... 56
scaling
  mechanical ... 71, 73
  optical ... 71
\scd (ᴅ) ... 11
\scg (ɢ) ... 11
\schwa (ə) ... 10
\schwa (ə) ... 11
Schwartz distribution spaces *see* alphabets, math
\sci (ɪ) ... 10
scientific symbols ... 47–50
\ScissorHollowLeft (✀) ... 51
\ScissorHollowRight (✁) ... 51
\ScissorLeft (✂) ... 51
\ScissorLeftBrokenBottom (✂) ... 51
\ScissorLeftBrokenTop (✂) ... 51
\ScissorRight (✂) ... 51
\ScissorRightBrokenBottom (✂) ... 51
\ScissorRightBrokenTop (✂) ... 51
scissors ... 51
\scn (ɴ) ... 10
\Scorpio (♏) ... 48
\scorpio (♏) ... 48
\scr (ʀ) ... 10
script letters *see* alphabets, math
\scripta (ɑ) ... 10
\scriptg (ɡ) ... 11
\scriptscriptstyle ... 67, 68
\scriptstyle ... 67, 68
\scriptv (ʋ) ... 11
\scu (ᴜ) ... 11
\scy (ʏ) ... 11
seagull ... *see* \textseagull
\Searrow (⇘) ... 32
\searrow (↘) ... 32
\searrow (↘) ... 31, 68
\sec (sec) ... 34
\Sech (𝆒) ... 57
\second (″) ... 45
seconds, angular .. *see* \second
\secstress (ˌ) ... 15
section mark ... *see* \S
\SectioningDiamond (⟐) ... 60
\see (⌓) ... 60
segmented digits ... 47
\selectfont ... 6
semantic valuation ... *see* \llbracket/\rrbracket *and* \lbbbrack/\rbbbrack
semidirect products .. 19, 21, 45
semitic transliteration .. 12, 15
semtrans (package) 12, 15, 79, 80
\SePa (𝈝) ... 57
\seppawns (○·○) ... 60
\SerialInterface (⧈) ... 49
\SerialPort (▭) ... 49
set operators
  intersection ... *see* \cap
  union ... *see* \cup
\setminus (\) ... 19
SGML ... 78
sha (III) ... 64
\sharp (♯) ... 44, 57
\Shilling (ß) ... 16
\shortdownarrow (↓) ... 32
\ShortFifty (🕪) ... 58
\ShortForty (🕩) ... 58
\shortleftarrow (←) ... 32
\shortmid (∣) ... 25
\ShortNinetyFive (🕫) ... 58
\shortparallel (∥) ... 25
\ShortPulseHigh (⨺) ... 47
\ShortPulseLow (⨻) ... 47
\shortrightarrow (→) ... 32
\ShortSixty (🕬) ... 58
\ShortThirty (🕭) ... 58
\shortuparrow (↑) ... 32
\showclock ... 60
\SI (✡) ... 49
\Sigma (Σ) ... 34
\sigma (σ) ... 34
\sigmaup (σ) ... 35
\sim (∼) ... 25, 67, 76
\simeq (≃) ... 25
\sin (sin) ... 34
\sinh (sinh) ... 34
\SixFlowerAlternate (✾) ... 53
\SixFlowerAltPetal (❋) ... 53
\SixFlowerOpenCenter (✼) ... 53
\SixFlowerPetalDotted (❀) ... 53
\SixFlowerPetalRemoved (✻) ... 53
\SixFlowerRemovedOpenPetal (❀) ... 53
\SixStar (✶) ... 53
\SixteenStarLight (✺) ... 53
skak (package) ... 60, 79, 80
skull (package) ... 55, 79, 80
\skull (☠) ... 55
\slash (/) ... 75
\slashb (⫽) ... 11
\slashc (⌿) ... 11
\slashd (⫻) ... 11
slashed (package) ... 67
\slashed ... 67
slashed letters ... 67
slashed.sty (file) ... 67
\slashu (⫼) ... 11
\Sleet (⛆) ... 59
\sliding (▬) ... 14
\SmallCircle (○) ... 54
\SmallCross (×) ... 54
\SmallDiamondshape (◇) ... 54
\smallfrown (⌢) ... 25
\SmallHBar (⁻) ... 54
\SmallLowerDiamond (⬙) ... 54
\smallpencil (✎) ... 51
\SmallRightDiamond (⬗) ... 54
\smallsetminus (∖) ... 19
\smallsmile (⌣) ... 25
\SmallSquare (□) ... 54
\SmallTriangleDown (▽) ... 54
\smalltriangledown (▿) ... 21
\SmallTriangleLeft (◁) ... 54
\smalltriangleleft (◃) ... 21
\SmallTriangleRight (▷) ... 54
\smalltriangleright (▹) ... 21

\SmallTriangleUp (△) 54
\smalltriangleup (▵) 21
\SmallVBar (∣) 54
\smile (⌣) 25
\Smiley (☺) 59
\smiley (☺) 57
smiley faces 49, 57, 59
\Snow (❄) 59
\SnowCloud (🌨) 59
\Snowflake (❋) 53
\SnowflakeChevron (❄) ... 53
\SnowflakeChevronBold (❄) 53
snowflakes 53, 54
\SO (♬) 49
\SOH (☺) 49
space
thin 75
space, visible 7
spades (suit) 44, 56
\spadesuit (♠) 44
\Sparkle (❋) 53
\SparkleBold (❋) 53
sparkles 53, 54
"special" characters 7
\SpecialForty (🛒) 58
\sphericalangle (∢) 45
\sphericalangle (◁) 44
\SpinDown ()↓..... 54
\SpinUp (↑) 54
\splitvert 49
\splitvert (¦) 49
\spreadlips (⫒) 14
\sqbullet (▪) 21
\sqcap (⊓) 21
\sqcap (⊓) 19
\sqcapplus (⨇) 20
\sqcup (⊔) 21
\sqcup (⊔) 19
\sqcupplus (⨈) 20
\sqdoublecap (⩋) 21
\sqdoublecup (⩊) 21
\sqiiint (⨌) 24
\sqiint (⨍) 24
\sqiint (⨍) 25
\sqint (⨖) 24
\sqint (⨖) 25
\sqrt (√■) 40, 68
\sqSubset (⊏) 28
\sqsubset (⊏) 28
\sqsubset (⊏) 28
\sqsubseteq (⊑) 28
\sqsubseteq (⊑) 28
\sqsubseteqq (⫋) 28
\sqsubsetneq (⋤) 28
\sqsubsetneqq (⫏) 28
\sqSupset (⊐) 28
\sqsupset (⊐) 28
\sqsupset (⊐) 28
\sqsupseteq (⊒) 28
\sqsupseteq (⊒) 28
\sqsupseteqq (⫌) 28
\sqsupsetneq (⋥) 28
\sqsupsetneqq (⫐) 28
\Square (□) 54
\Square (□ vs. □ vs. □) ... 65
\Square (□) 53
\Square (□) 55
\square (▫) 21
\square (□) 44
square root ..... *see* \sqrt
hooked ..... *see* \hksqrt
\SquareCastShadowBottomRight (❏) 55
\SquareCastShadowTopLeft (❐) 55
\SquareCastShadowTopRight (❐) 55
\Squaredot (·) 44
\Squarepipe (⧈) 49
squares 54, 55
\SquareShadowA (❑) 54
\SquareShadowB (❑) 54
\SquareShadowBottomRight (❑) 55
\SquareShadowC (❑) 54
\SquareShadowTopLeft (❐) . 55
\SquareShadowTopRight (❐) 55
\SquareSolid (■) 55
\Squaresteel (■) 49
\squarewithdots (⚅) 56
\squplus (⨄) 21
\SS (SS) 8
\ss (ß) 8
\ssearrow (⤡) 32
\sslash (⫽) 20
\sswarrow (⤢) 32
\stackrel 19, 70
\star (⋆) 19, 69
Star of David 53
stars 44, 53, 54
statistical independence 68
sterling ..... *see* \pounds
stmaryrd (package) 20, 22, 26, 28, 30, 32, 33, 36, 37, 65, 78–80
stochastic independence *see* \bot
\StoneMan (▲) 59
\Stopsign (⛔) 50
\StopWatchEnd (⏱) 60
\StopWatchStart (⏱) 60
\stress (') 15
\strictfi (⥾) 26
\strictif (⥽) 26
\strictiff (⥾⥽) 26
\StrokeFive (𝍸) 60
\StrokeFour (𝍷) 60
\StrokeOne (𝍵) 60
\StrokeThree (𝍶) 60
\StrokeTwo (𝍷) 60
\STX (☻) 49
\SUB (→) 49
\subcorner (⫏) 14
\subdoublebar (⫑) 14
\subdoublevert (⫏) 14
\sublptr (⫏) 14
\subrptr (⫏) 14
subscripts
new symbols used in ... 67
\Subset (⋐) 28
\Subset (⋐) 28
\subset (⊂) 28
\subset (⊂) 28
\subseteq (⊆) 28
\subseteq (⊆) 28
\subseteqq (⫅) 28
\subseteqq (⫅) 28
\subsetneq (⊊) 28
\subsetneq (⊊) 28
\subsetneqq (⫋) 28
\subsetneqq (⫋) 28
\subsetplus (⪿) 28
\subsetpluseq (⫀) 28
subsets 28
\succ (≻) 25
\succapprox (⪸) 27
\succapprox (≿) 25
\succcurlyeq (≽) 27
\succcurlyeq (≽) 25
\succdot (≻) 27
\succeq (⪰) 25
\succeqq (⪴) 26
\succnapprox (⪺) 27
\succnapprox (⋩) 26
\succneq (⪈) 27
\succneqq (⪈) 26
\succnsim (⋩) 27
\succnsim (⋩) 26
\succsim (≿) 27
\succsim (≿) 25
such that (ɜ) 66
\sum (∑) 21
\Summit (▲) 59
\SummitSign (✝) 59
\Sun (⊙) 48
\Sun (☉ vs. ☼ vs. ⊙) 65
\Sun (☉) 48
\Sun (☼) 59
\sun (☼) 57
\SunCloud (🌤) 59
\SunshineOpenCircled (✪) . 56
\sup (sup) 34
superscripts
new symbols used in ... 67
supersets 28
\Supset (⋑) 28
\Supset (⋑) 28
\supset (⊃) 28
\supset (⊃) 28
\supseteq (⊇) 28
\supseteq (⊇) 28

\supseteqq (⫆) 28
\supseteqq (⫆) 28
\supsetneq (⊋) 28
\supsetneq (⊋) 28
\supsetneqq (⫌) 28
\supsetneqq (⫌) 28
\supsetplus (⫀) 28
\supsetpluseq (⫂) 28
\surd (√) 44
\SurveySign (⧋) 59
\Swarrow (⇙) 32
\swarrow (↙) 32
\swarrow (↙) 31, 68, 69
swung dash . . . . . *see* \sim
\syl (▪) 14
\syllabic (◌̩) 15
Symbol (PostScript font) 35, 64
symbols
  alpine 59
  APL 49
  astrological 48
  astronomical 48
  biological 50
  body-text 7–18
  bold 75
  chess 60
  clock 60
  communication 49
  computer hardware 49
  contradiction 19, 33
  currency 16, 46
  dangerous bend 55
  definition 19, 70
  dictionary 9–12, 63
  dingbat 51–56
  dot 43
  electrical 47
  engineering 47, 49
  genealogical 57
  general 57
  information 55
  informator 60
  Knuth's 55, 58
  laundry 58
  legal 7, 17, 77
  letter-like 35, 36
  linguistic 9–12
  log-like 34, 75
  mathematical 19–46
  METAFONTbook 58
  metrical 61
  miscellaneous 44, 45, 56–63
  monetary 16, 46
  musical 18, 44, 57, 58
  navigation 58
  non-commutative division 43
  Phaistos disk 62
  phonetic 9–12
  physical 47
  proto-Semitic 62
  pulse diagram 47
  relational 25
  reversed 66
  rotated 15, 66
  safety-related 50
  scientific 47–50
  subset and superset . . . 28
  technological 47–50
  TEXbook 55, 58
  transliteration 12
  upside-down 15, 66, 75
  variable-sized 21–25
  weather 59
  zodiacal 48
symbols.tex (file) . . . 64, 78, 79
SYMLIST (file) 79
\SYN (▬) 49

T

\T 8
\T (▪) 15
\T (⊗) 61
\t (▪) 12
\t (⊗) 61
t4phonet (package) 12, 15, 79, 80
t5 (package) 79
tacks 25, 35
\taild (◌̢) 11
\tailinvr (◌̣) 11
\taill (◌̴) 11
\tailn (◌̨) 11
\tailr (◌̺) 11
\tails (◌̪) 11
\tailt (◌̯) 11
\tailz (◌̫) 11
\Takt 58
\talloblong (▯) 20
tally markers 60
\tan (tan) 34
\tanh (tanh) 34
\Tape (🕷) 56
\Taschenuhr (⏱) 60
Tate-Shafarevich group *see* sha
\tau (τ) 34
\Taurus (♉) 48
\Taurus (♉) 48
\taurus (♉) 48
\tauup (τ) 35
\tccentigrade (℃) 43
\tcmu (μ) 43
\tcohm (Ω) 43
\tcpertenthousand (‱) . . 43
\tcperthousand (‰) 43
\td (▪) 14
technological symbols . . 47–50
\Telefon (☎) 49
\Telephone (☎) 60
\Tent (⛺) 59
\Terminus (⊗) 61
\terminus (⊗) 61
\Terminus* (⊕) 61
\terminus* (⊕) 61
\tesh (ʧ) 11
testfont.dvi (file) 73
testfont.tex (file) 73
TEX . . 64, 66–71, 73, 74, 76, 81
TEXbook, The 66–70, 74
  symbols from 55, 58
\text 19, 67, 68
\textacutedbl (˝) 16
\textacutemacron (▪) 12
\textacutewedge (▪) 12
\textadvancing (▪) 13
\textaolig (æ) 10
\textasciiacute (´) . . . 16, 77
\textasciibreve (˘) 16
\textasciicaron (ˇ) 16
\textasciicircum (ˆ) . . . 7, 76
\textasciidieresis (¨) 16, 77
\textasciigrave (`) 16
\textasciimacron 78
\textasciimacron (¯) . 16, 77
\textasciitilde (˜) 7, 76
\textasteriskcentered (∗) . 7, 18
\textbabygamma (ɤ) 9
\textbackslash (\) 7, 76
\textbaht (฿) 16
\textbar (|) 7, 75, 76
\textbarb (ƀ) 9
\textbarc (ȼ) 9
\textbard (đ) 9
\textbardbl (‖) 18
\textbardotlessj (ɟ) 9
\textbarg (ɠ) 9
\textbarglotstop (ʔ) 9
\textbari (ɨ) 9
\textbarl (ɬ) 9
\textbaro (ɵ) 9
\textbarrevglotstop (ʕ) . . . 9
\textbaru (ʉ) 9
\textbeltl (ɬ) 9
\textbenttailyogh (ʒ) 10
\textbeta (β) 9
\textbigcircle (◯) 18
\textbktailgamma (ɣ) 10
\textblank (␢) 18
\textborn (⋆) 57
\textbottomtiebar (▪) 13
\textbraceleft ({) 7
\textbraceright (}) 7
\textbrevemacron (▪) 13
\textbrokenbar (¦) 18, 77
\textbullet (•) 7, 18
\textbullseye (⊙) 9
\textcelsius (℃) 47
\textceltpal (′) 9
\textcent (¢) 16, 77
\textcentoldstyle (¢) 16
\textchi (χ) 9
\textcircled (▪) 12
\textcircledP (℗) 17
\textcircumacute (▪) 13
\textcircumdot (▪) 13
\textcloseepsilon (ɛ) 9
\textcloseomega (ɷ) 9
\textclosserevepsilon (ɜ) . . . 9

\textcolonmonetary (₡) ... 16
\textcommatailz (ʒ) 9
textcomp (package) 6, 7, 12, 16–18, 31, 39, 45, 47, 57, 64, 76, 78–80
\textcopyleft (🄯) 17
\textcopyright (©) . 7, 17, 77
\textcorner (ˀ) 9
\textcrb (ƀ) 9
\textcrd (đ) 9
\textcrd (đ) 12
\textcrg (ǥ) 9
\textcrh (ħ) 9
\textcrh (ħ) 12
\textcrinvglotstop (ƚ) 9
\textcrlambda (ƛ) 9
\textcrtwo (ƻ) 9
\textctc (ƈ) 9
\textctd (ȡ) 9
\textctdctzlig (ʥ) 9
\textctesh (ʃ) 9
\textctinvglotstop (ʖ) ... 10
\textctj (ʝ) 9
\textctjvar (ʄ) 10
\textctn (ƞ) 9
\textctstretchc (ʗ) 10
\textctstretchcvar (ƈ) ... 10
\textctt (ŧ) 9
\textcttctclig (ʨ) 9
\textctturnt (ʇ) 10
\textctyogh (ȝ) 9
\textctz (ƶ) 9
\textcurrency (¤) 16, 77
\textdagger (†) 7, 18
\textdaggerdbl (‡) 7, 18
\textdbend ( ) 55
\textdblhyphen (=) 18
\textdblhyphenchar (=) 18
\textdblig (ȸ) 10
\textdctzlig (ʣ) 9
\textdegree (°) 45, 77
\textdied (†) 57
\textdiscount (⁒) 18
\textdiv (÷) 45
\textdivorced (⚮) 57
\textdollar ($) 7, 16
\textdollaroldstyle ($) .. 16
\textdong (₫) 16
\textdotacute (◽́) 13
\textdotbreve (◽̆) 13
\textdoublebaresh (ǂ) 9
\textdoublebarpipe (ǂ) 9
\textdoublebarpipevar (ǂ) . 10
\textdoublebarslash (≠) ... 9
\textdoublegrave (◽̏) 13
\textdoublegrave (◽̏) 15
\textdoublepipe (‖) 9
\textdoublepipevar (‖) ... 10
\textdoublevbaraccent (◽̋) . 13
\textdoublevbaraccent (◽̋) . 15
\textdoublevertline (‖) ... 9
\textdownarrow (↓) 31
\textdownfullarrow (↓) ... 10
\textdownstep (ꜜ) 9
\textdyoghlig (ʤ) 9
\textdzlig (ʣ) 9
\texteightoldstyle (8) ... 17
\textellipsis (...) 7
\textemdash (—) 7
\textendash (–) 7
\textepsilon (ɛ) 9
\textepsilon (ɛ) 12
\textesh (ʃ) 9
\textesh (ʃ) 12
\textestimated (℮) 18
\texteuro (€) 16
\textexclamdown (¡) 7
\textfemale (♀) 10
\textfishhookr (ɾ) 10
\textfiveoldstyle (5) 17
\textfjlig (ﬄ) 12
\textflorin (f) 16
\textfouroldstyle (4) 17
\textfractionsolidus (/) .. 45
\textfrak 46
\textfrbarn (ɲ) 10
\textfrhookd (ɗ) 10
\textfrhookdvar (ɗ) 10
\textfrhookt (ƭ) 10
\textfrtailgamma (ɣ) 10
\textg (g) 10
\textgamma (ɣ) 10
\textglobfall (↘) 10
\textglobrise (↗) 10
\textglotstop (ʔ) 9
\textglotstopvari (ʔ) 10
\textglotstopvarii (ʔ) ... 10
\textglotstopvariii (ʔ) .. 10
\textgoth 46
\textgravecircum (◽̑) 13
\textgravedbl (◽̏) 16
\textgravedot (◽̇) 13
\textgravemacron (◽̄) 13
\textgravemid (◽̀) 13
\textgreater (>) ... 7, 75, 76
\textgrgamma (γ) 10
\textguarani (₲) 16
\texthalflength (ː) 9
\texthardsign (ъ) 9
\textheng (ɧ) 10
\texthmlig (ɦ) 10
\texthooktop (ʰ) 9
\texthtb (ɓ) 9
\texthtb (ɓ) 12
\texthtbardotlessj (ʃ) 9
\texthtbardotlessjvar (ʃ) . 10
\texthtc (ƈ) 9
\texthtc (ƈ) 12
\texthtd (ɗ) 9
\texthtd (ɗ) 12
\texthtg (ǧ) 9
\texthth (ɦ) 9
\texththeng (ﬅ) 9
\texthtk (ƙ) 9
\texthtk (ƙ) 12
\texthtp (ƥ) 9
\texthtp (ƥ) 12
\texthtq (ʠ) 9
\texthtrtaild (ʡ) 9
\texthtscg (ɠ) 9
\texthtt (ƫ) 9
\texthtt (ƫ) 12
\texthvlig (ƕ) 9
\textifsym 47
\textinterrobang (‽) 18
\textinterrobangdown (⸘) .. 18
\textinvglotstop (ʖ) 9
\textinvomega (ʊ) 10
\textinvsca (ʌ) 10
\textinvscr (ʁ) 9
\textinvscripta (ɑ) 10
\textinvsubbridge (◽̪) 13
\textiota (ι) 9
\textiota (ι) 12
\textlambda (λ) 9
\textlangle (⟨) 39, 75
\textlbrackdbl (⟦) 39
\textleaf (🍃) 57
\textleftarrow (←) 31
\textlengthmark (ː) 9
\textless (<) 7, 75, 76
\textlfishhookrlig (ɦ) ... 10
\textlhdbend ( ) 55
\textlhookfour (ɬ) 10
\textlhookp (ƥ) 10
\textlhookt (ƫ) 9
\textlhti (ɪ) 10
\textlhtlongi (ɿ) 9
\textlhtlongy (ʯ) 9
\textlira (₤) 16
\textlnot (¬) 45, 77
\textlonglegr (ɾ) 9
\textlooptoprevesh (ɭ) 10
\textlowering (◽̩) 13
\textlptr (ˁ) 9
\textlquill (⁅) 39
\textltailm (ɱ) 9
\textltailn (ɲ) 9
\textltailn (ɲ) 12
\textltilde (ɬ) 9
\textlyoghlig (ɮ) 9
\textmarried (⚭) 57
\textmho (℧) 47
\textmidacute (◽́) 13
\textminus (−) 45
\textmu (μ) 47, 77
\textmusicalnote (♪) 18
\textnaira (₦) 16
\textnineoldstyle (9) 17
\textnrleg (ŋ) 10
\textnumero (№) 18
\textOBardotlessj (ɟ) 9
\textObullseye (⊙) 10
\textohm (Ω) 47
\textOlyoghlig (ɮ) 9
\textomega (ω) 9
\textonehalf (½) 45, 77

\textoneoldstyle 17
\textoneoldstyle (1) 17
\textonequarter ($\frac{1}{4}$) . . . 45, 77
\textonesuperior (^{1}) . . 45, 77
\textopenbullet (○) 18
\textopencorner (⌜) 9
\textopeno (ɔ) 9
\textopeno (ɔ) 12
\textordfeminine (^{a}) 7, 18, 77
\textordmasculine (^{o}) 7, 18, 77
\textovercross (▀) 13
\textoverw (▀) 13
\textpalhook (ʯ) 9
\textpalhooklong (ʮ) 10
\textpalhookvar (ʭ) 10
\textparagraph (¶) 7, 18
\textperiodcentered (·) . 7, 18, 77
\textpertenthousand (‱) . 18
\textperthousand (‰) 18
\textpeso (₱) 16
\textphi (ɸ) 9
\textpilcrow (¶) 18
\textpipe (|) 9
\textpipe (|) 12
\textpipevar (|) 10
\textpm (±) 45, 77
\textpmhg 63
\textpolhook (▀) 13
\textprimstress (ˈ) 9
\textproto 62
\textqplig (qp) 10
\textquestiondown (¿) 7
\textquotedbl (") 8, 75
\textquotedblleft (“) 7
\textquotedblright (”) 7
\textquoteleft (‘) 7
\textquoteright (’) 7
\textquotesingle (') 18
\textquotestraightbase (‚) 18
\textquotestraightdblbase („) 18
\textraiseglotstop (ʔ) 9
\textraisevibyi (ɻ) 9
\textraising (▀) 13
\textramshorns (ɤ) 9
\textrangle (⟩) 39, 75
\textrbrackdbl (⟧) 39
\textrecipe (℞) 18, 66
\textrectangle (▫) 10
\textreferencemark (※) 18, 19
\textregistered (®) 7, 17, 77
\textretracting (▀) 13
\textretractingvar (˕) . . . 10
\textrevapostrophe (ʻ) 9
\textreve (ɘ) 9
\textrevepsilon (ɜ) 9, 66
\textreversedvideodbend (▀) 55
\textrevglotstop (ʕ) 9
\textrevscl (ɹ) 10
\textrevscr (ɾ) 10
\textrevyogh (ʒ) 9
\textrhooka (ɑ̡) 10
\textrhooke (e̡) 10
\textrhookepsilon (ɛ̡) 10
\textrhookopeno (ɔ̡) 10
\textrhookrevepsilon (ɜ́) . . 9
\textrhookschwa (ɚ) 10
\textrhoticity (˞) 10
\textrightarrow (→) 31
\textringmacron (▀) 13
\textroundcap (▀) 13
\textrptr (˒) 10
\textrquill (ʖ) 39
\textrtaild (ɖ) 10
\textrtaild (ɖ) 12
\textrtailhth (ɦ) 10
\textrtaill (ɭ) 10
\textrtailn (ɳ) 9
\textrtailr (ɽ) 9
\textrtails (ʂ) 9
\textrtailt (ʈ) 9
\textrtailt (ʈ) 12
\textrtailz (ʐ) 9
\textrthook (ɻ) 9
\textrthooklong (ɺ) 10
\textsca (ᴀ) 9
\textscaolig (ꭤ) 10
\textscb (ʙ) 9
\textscdelta (ᴤ) 10
\textsce (ᴇ) 9
\textscf (ꜰ) 10
\textscg (ɢ) 9
\textsch (ʜ) 9
\textschwa (ə) 9
\textschwa (ɗ) 12
\textsci (ɪ) 9
\textscj (ᴊ) 9
\textsck (ᴋ) 10
\textscl (ʟ) 9
\textscm (ᴍ) 10
\textscn (ɴ) 9
\textscoelig (ɶ) 9
\textscomega (ɷ) 9
\textscp (ᴘ) 10
\textscq (ꞯ) 10
\textscr (ʀ) 9
\textscripta (ɑ) 9
\textscriptg (ɡ) 9
\textscriptv (ʋ) 9
\textscriptv (ʃ) 12
\textscu (ᴜ) 9
\textscy (ʏ) 9
\textseagull (▀) 13
\textsecstress (ˌ) 9
\textsection (§) 7, 18
\textservicemark (℠) 17
\textsevenoldstyle (7) . . . 17
\textsixoldstyle (6) 17
\textsoftsign (ь) 9
\textspleftarrow (ʿ) 10
\textsterling (£) 7, 16
\textstretchc (ƈ) 9
\textstretchcvar (ƈ) 10
\textstyle 67, 68, 74
\textsubacute (▀) 13
\textsubarch (▀) 13
\textsubbar (▀) 13
\textsubbridge (▀) 13
\textsubcircum (▀) 13
\textsubdot (▀) 13
\textsubdoublearrow (↔) . . 10
\textsubgrave (▀) 13
\textsublhalfring (▀) 13
\textsubplus (▀) 13
\textsubrhalfring (▀) 13
\textsubrightarrow (⟶) . . . 10
\textsubring (▀) 13
\textsubsquare (▀) 13
\textsubtilde (▀) 13
\textsubumlaut (▀) 13
\textsubw (▀) 13
\textsubwedge (▀) 13
\textsuperimposetilde (▀) . 13
\textsuperscript 14
\textsurd (√) 45
\textswab 46
\textsyllabic (▀) 14
\texttctclig (ʨ) 9
\textteshlig (ʧ) 9
\textteshlig (ʧ) 12
\texttheta (θ) 9
\textthorn (þ) 9
\textthornvari (þ) 10
\textthornvarii (þ) 10
\textthornvariii (þ) 10
\textthornvariv (þ) 10
\textthreeoldstyle (3) . . . 17
\textthreequarters ($\frac{3}{4}$) 45, 77
\textthreequartersemdash (—) 18
\textthreesuperior (^{3}) 45, 77
\texttildedot (▀) 14
\texttildelow (~) 18, 76
\texttimes (×) 45
\texttoneletterstem (|) 9
\texttoptiebar (▀) 14
\texttrademark (™) 7, 17
\texttslig (ʦ) 9
\textturna (ɐ) 9
\textturncelig (ɞ) 9
\textturnglotstop (ʡ) 10
\textturnh (ɥ) 9
\textturnk (ɮ) 9
\textturnlonglegr (ɭ) 9
\textturnm (ɯ) 9
\textturnmrleg (ɰ) 9
\textturnr (ɹ) 9
\textturnrrtail (ɻ) 9
\textturnsck (ʞ) 10
\textturnscripta (ɒ) 9
\textturnscu (ɔ) 10
\textturnt (ʇ) 9
\textturnthree (ɜ) 10
\textturntwo (ʊ) 10
\textturnv (ʌ) 9

\textturnw (ʍ) 9
\textturny (ʎ) 9
\texttwelveudash (—) 18
\texttwooldstyle 17
\texttwooldstyle (2) 17
\texttwosuperior (²) . . 45, 77
\textuncrfemale (♀) 10
\textunderscore (_) 7
\textuparrow (↑) 31
\textupfullarrow (↑) 10
\textupsilon (ʊ) 9
\textupstep (ˈ) 9
\textvbaraccent (◾) 14
\textvbaraccent (◾) 15
\textvertline (|) 9
\textvibyi (ɻ) 10
\textvibyy (ʯ) 10
\textvisiblespace (␣) 7
\textwon (₩) 16
\textwynn (ƿ) 10
\textyen (¥) 16, 77
\textyogh (ʒ) 10
\textyogh (ʒ) 12
\textzerooldstyle (0) 17
\TH (Þ) 8
\th (þ) 8
Thành, Hàn Thế 69
\therefore (∴) 27
\therefore (∴) 25
\Thermo 59
\Theta (Θ) 34
\theta (θ) 34
\thetaup (θ) 35
\thickapprox (≈) 25
\thicksim (∼) 25
\thickvert (|) 38
thin space 75
\ThinFog (▒) 59
\third (m) 45
\Thorn (Þ) 11
\thorn (þ) 11
\thorn (þ) 11
\thorn (þ) 11
\threesim (≋) 67
tilde 7, 9, 10, 12, 15, 18, 39, 40, 42, 69, 76
  extensible 40, 42
  vertically centered 76
\tilde (◾̃) 39, 69
\tildel (ŧ) 11
time of day 60
\timelimit (⊕) 60
\times (×) 19
Times (PostScript font) 16
timing (package) 47
tipa (package) . 9, 10, 12, 14, 15, 66, 79, 80
tipx (package) 10, 79, 80
\to . . . . . *see* \rightarrow
\ToBottom (⧩) 58
\tone 10
\top (⊤) 35, 67
\topbot (⊥) 67, 69
\topdoteq (≒) 27
torus (𝕋) . *see* alphabets, math
\ToTop (⧨) 58
trademark . *see* \texttrademark
\TransformHoriz (⊶) 27
transforms . . . . 27, 39, *see also* alphabets, math
\TransformVert (⥉) 27
transliteration
  semitic 12, 15
transliteration symbols 12
transversality . *see* \pitchfork
trfsigns (package) . 27, 36, 39, 79
\triangle (△) 44
triangle relations 30
\TriangleDown (▽) 54
\TriangleDown (▼ vs. ▽) . . 65
\TriangleDown (▼) 55
\triangledown (▽) 44
\TriangleLeft (◁) 54
\triangleleft (◁) 30
\triangleleft (◁) 19
\trianglelefteq (⊴) 30
\trianglelefteq (⊴) 30
\trianglelefteqslant (⊴) . 30
\triangleq (≜) 19, 30
\TriangleRight (▷) 54
\triangleright (▷) 30
\triangleright (▷) 19
\trianglerighteq (⊵) 30
\trianglerighteq (⊵) 30
\trianglerighteqslant (⊵) 30
triangles 44, 54, 55
\TriangleUp (△) 54
\TriangleUp (▲ vs. △) 65
\TriangleUp (▲) 55
\triple 38
trsym (package) 27, 79, 80
\tsbm (‿) 61
\tsmb (‿) 61
\tsmm (‿) 61
\Tsteel (𝙏) 49
\TTsteel (𝙸) 49
TUGboat 40
\Tumbler (🖵) 58
\TwelweStar (✹) 53
\twoheadleftarrow (↞) . . . 31
\twoheadrightarrow (↠) . . 31
\twonotes (♫) 57
txfonts (package) 19, 20, 24–26, 28, 29, 31–33, 35, 36, 44, 46, 64, 66, 76, 79, 80
Type 1 (PostScript font) 73, 74

U

\U (◾̲) 15
\U (◾̈) 12
\u (◾̆) 12
\UB (ϟ) 57
\ubar (ʉ) 11
ubulb.fd (file) 73
\udesc (ɥ) 11
\udot (·) 21
\UHORN (Ư) 8
\uhorn (ư) 8
\ulcorner (⌜) 36
\ulcorner (⌜) 36
ulsy (package) 21, 33, 79
\Umd (◾̃) 58
umlaut . . . . . *see* accents
\unclear (∞) 60
\underaccent 69
\underarc (◾̲) 15
\underarch (◾̲) 14
\underbrace (◾⏟) 42
\underbrace (◾⏟) 40
\underbracket (◾⎵) 41
\underbracket (◾⎵) 69, 70
\underdots (◾̤) 15
\undergroup (◾⏡) 42
\underleftarrow (◾⃮) 40
\underleftrightarrow (◾⃡) 40
\underline (◾̲) 40
\underparenthesis (◾⏝) 69, 70
\underrightarrow (◾⃯) 40
\underring (◾̥) 15
underscore . . . . . *see* _
underscore (package) 7
undertilde (package) . . 42, 79, 80
\undertilde (◾̰) 15
\underwedge (◾̬) 15
union . . . . . *see* \cup
\unitedpawns (○○) 60
units (package) 45
unity (𝟙) . . *see* alphabets, math
universa (package) 55, 59, 79, 80
\unlhd (⊴) 19, 20
\unrhd (⊵) 19, 20
\upalpha (α) 35
\UParrow (▲) 57
\Uparrow (⇑) 31, 37
\uparrow (↑) 31, 37
\upbar 14
\upbeta (β) 35
\upbracketfill 70
\upchi (χ) 35
\Updelta (Δ) 35
\updelta (δ) 35
\Updownarrow (⇕) 31, 37
\updownarrow (↕) 31, 37
\updownarrows (↑↓) 32
\updownharpoons (⥮) 33
\upepsilon (ε) 35
\upeta (η) 35
\Upgamma (Γ) 35
\upgamma (γ) 35
upgreek (package) . . . 35, 79, 80
\upharpoonleft (↿) 33
\upharpoonleft (↿) 31

\upharpoonright (↾) 33
\upharpoonright (↾) 31
\upiota (ι) 35
\upkappa (κ) 35
\Uplambda (Λ) 35
\uplambda (λ) 35
\uplett 14
\uplus (⊎) 21
\uplus (⊎) 19
\upmu (μ) 35
\upnu (ν) 35
\Upomega (Ω) 35
\upomega (ω) 35
\upp (^) 15
\upparenthfill 70
\Upphi (Φ) 35
\upphi (ϕ) 35
\Uppi (Π) 35
\uppi (π) 35
\Uppsi (Ψ) 35
\uppsi (ψ) 35
upquote (package) 76
\uprho (ρ) 35
upright Greek letters 35
upside-down symbols 75
upside-down symbols . . . 15, 66
\Upsigma (Σ) 35
\upsigma (σ) 35
\Upsilon (Υ) 34
\upsilon (υ) 34
\upsilonup (υ) 35
\upt (⊥) 15
\uptau (τ) 35
\Uptheta (Θ) 35
\uptheta (θ) 35
\uptodownarrow (↕) 32
\upuparrows (⇈) 32
\upuparrows (⇈) 31
\upupharpoons (↿) 33
\Upupsilon (Υ) 35
\upupsilon (υ) 35
\upvarepsilon (ε) 35
\upvarphi (φ) 35
\upvarpi (ϖ) 35
\upvarrho (ρ) 35
\upvarsigma (σ) 35
\upvartheta (ϑ) 35
\Upxi (Ξ) 35
\upxi (ξ) 35
\upzeta (ζ) 35
\Uranus (♅) 48
\Uranus (♅) 48
\uranus (♅) 48
\urcorner (⌝) 36
\urcorner (⌝) 36
url (package) 76
\US (▾) 49
\usepackage 6
\ut (■) 14
\utilde (■) 42

V

\v (■) 12
\vara (ɑ) 11
\varangle (⍼) 44
\varbigcirc (◯) 20
\VarClock (🕒) 60
\varclubsuit (♧) 44
\varcurlyvee (⋎) 20
\varcurlywedge (⋏) 20
\vardiamondsuit (♦) 44
\varEarth (🜨) 48
\varepsilon (ε) 34
\varepsilonup (ε) 35
\VarFlag (⚑) 59
varg (txfonts/pxfonts package option) 35
\varg (g) 35
\varg (ɡ) 11
\vargeq (≥) 30
\varhash (#) 45
\varheartsuit (♥) 44
\varhexagon (⬡) 54
\varhexstar (⁎) 53
\vari (ι) 11
variable-sized symbols . . 21–25
\VarIceMountain (🗻) 59
\varinjlim (lim→) 34
\varint (⨍) 22
\various (R) 60
\varkappa (ϰ) 34
\varleq (≤) 30
\varliminf (lim) 34
\varlimsup (lim) 34
\varmathbb 46
\VarMountain (🗻) 59
\varnothing (∅) 19, 44
\varnotin (∉) 36
\varnotowner (∌) 36
\varoast (⊛) 20
\varobar (⍜) 20
\varobslash (⦸) 20
\varocircle (⊚) 20
\varodot (⊙) 20
\varogreaterthan (⧁) 20
\varoiiintclockwise (∱) . 24
\varoiiintctrclockwise (∱) 24
\varoiint (∯) 25
\varoiintclockwise (∯) . . 24
\varoiintctrclockwise (∯) 24
\varoint (∮) 22
\varointclockwise (∲) 24
\varointclockwise (∲) 25
\varointctrclockwise (∳) . 24
\varointctrclockwise (∳) . . 25
\varolessthan (⧀) 20
\varomega (ω) 11
\varominus (⊖) 20
\varopeno (ɔ) 11
\varoplus (⊕) 20
\varoslash (⊘) 20
\varotimes (⊗) 20
\varovee (⍛) 20
\varowedge (⍟) 20
\varparallel (⫽) 26
\varparallelinv (⫲) 26
\varphi (φ) 34
\varphiup (φ) 35
\varpi (ϖ) 34
\varpiup (ϖ) 35
\varprod (⨉) 24
\varprojlim (lim←) 34
\varpropto (∝) 25
\varrho (ϱ) 34
\varrhoup (ϱ) 35
\varsigma (ς) 34
\varsigmaup (ς) 35
\varspadesuit (♤) 44
\varsqsubsetneq (⋤) 28
\varsqsubsetneqq (⋥) 28
\varsqsupsetneq (⋣) 28
\varsqsupsetneqq (⋧) 28
\varstar (⋆) 21
\varsubsetneq (⫋) 28
\varsubsetneq (⫋) 28
\varsubsetneqq (⫍) 28
\varsubsetneqq (⫋) 28
\VarSummit (△) 59
\varsupsetneq (⫌) 28
\varsupsetneq (⫌) 28
\varsupsetneqq (⫎) 28
\varsupsetneqq (⫌) 28
\VarTaschenuhr (⏲) 60
\vartheta (ϑ) 34
\varthetaup (ϑ) 35
\vartimes (⨯) 20
\vartriangle (△) 44
\vartriangleleft (◅) 30
\vartriangleleft (◁) 30
\vartriangleright (▻) 30
\vartriangleright (▷) 30
\varv (v) 35
\varw (w) 35
\vary (y) 35
\VBar (∣) 54
\vcenter 67
\VDash (⊫) 27
\Vdash (⊩) 27
\Vdash (⊩) 25
\vDash (⊨) 27
\vDash (⊨) 25
\vdash (⊢) 25

\vdots (⋮) 43
\vec (■) 39
\Vectorarrow (⃗) 44
\Vectorarrowhigh (⃗) 44
\vee (∨) 21
\vee (∨) 19
\veebar (⊻) 21
\veebar (⊻) 19
\veedoublebar (⩡) 21
\Venus (♀) 48
\Venus (♀) 48
\venus (♀) 48

\vernal (♈) 48
\Vert (‖) 37
\vert (|) 37
\VHF (≋) 47
\Vier (𝅘𝅥) 57
\Village (⌂⌂⌂) 59
\vin (⌟) 36
vinculum . . . . . *see* \overline
\ViPa (ɾ) 57
\Virgo (♍) 48
\virgo (♍) 48
\VM (>) 57
vntex (package) 8, 12
\vod (ɣ) 11
\voicedh (ð) 11
\vppm (ɨ) 61
\vpppm (i) 61
\VT (♂) 49
\vv (⃗■) 42
\VvDash (⊪) 26
\Vvdash (⊪) 27
\Vvdash (⊪) 25
\vvvert (⦀) 38

W

\WashCotton (🧺) 58
\WashSynthetics (🧺) 58
\WashWool (🧺) 58
\wasylozenge (⌑) 57
\wasypropto (∝) 26
wasysym (package) 11, 16, 18–20, 22, 25, 26, 28, 29, 31, 44, 47–50, 53, 54, 57, 65, 79, 80
\wasytherefore (∴) 44
\wbetter (±) 60
\wdecisive (+−) 60
\weakpt (╳) 60
\WeakRain (⛆) 59
\WeakRainCloud (⛈) 59
weather symbols 59
\Wecker (🕗) 60
\wedge (∧) 21
\wedge (∧) 19
Weierstrass ℘ function . *see* \wp
\Wheelchair (♿) 55
\whistle (■) 14
\widearrow (■⃗) 42
\widebar (■̄) 42
\widecheck (■̌) 42
\widehat (■̂) 40
\wideparen (■⏜) 42
\wideparen (■⏜) 40
\widering (■̊) 42
\widering (■̊) 40
\widetilde (■̃) 40, 42
\widetriangle (■◬) 40
\wind 59
Windows 78
\with (⌟) 60
\withattack (→) 60
\withidea (△) 60
\withinit (↑) 60
\without (⌞) 60
\Womanface (😠) 59
won . . . . . *see* \textwon
\wp (℘) 35
\wr (≀) 19
wreath product . . . . . *see* \wr
\Writinghand (✍) 55
wsuipa (package) 10, 14, 15, 65, 66, 69, 79, 80
\wupperhand (±) 60

X

\x (::) 61
\XBox (⊠) 53
Xdvi 66
\xhookleftarrow (■⃖↩) 41
\xhookrightarrow (■↪) 41
\Xi (Ξ) 34
\xi (ξ) 34
\xiup (ξ) 35
\xLeftarrow (■⃖⇐) 41
\xleftarrow (■⃖←) 40
\xleftharpoondown (■⃖↽) . . . 41
\xleftharpoonup (■⃖↼) 41
\xLeftrightarrow (■⃖⇔) . . . 42
\xLeftrightarrow (■⃖⇔) . . . 41
\xleftrightarrow (■⃖↔) . . . 42
\xleftrightarrow (■⃖↔) . . . 41
\xleftrightharpoons (■⃖⇋) . 41
\xlongequal (■⃖=) 42
\xLongleftarrow (■⃖⟸) 42
\xlongleftarrow (■⃖⟵) 42
\xLongleftrightarrow (■⃖⟺) 42
\xlongleftrightarrow (■⃖⟷) 42
\xLongrightarrow (■⟹) . . . 42
\xlongrightarrow (■⟶) . . . 42
\xmapsto (■↦) 41
XML 78
\xRightarrow (■⇒) 41
\xrightarrow (■→) 40
\xrightharpoondown (■⇁) . . 41
\xrightharpoonup (■⇀) 41
\xrightleftharpoons (■⇌) . 41
\xrightleftharpoons (■⇌) . 41
Xs 52, 53, 55
\XSolid (╳) 52
\XSolidBold (✖) 52
\XSolidBrush (✗) 52
XY-pic 68

Y

\Ydown (ʏ) 20
yen . . . . . *see* \textyen
yfonts (package) 46, 79, 80
yhmath (package) 39, 40, 42, 43, 69, 79
\Yinyang (☯) 59
\Yleft (≺) 20
\yogh (ȝ) 11
\yogh (ȝ) 11
\Yright (≻) 20
\Yup (ʎ) 20

Z

Zapf Chancery (PostScript font) 46
Zapf Dingbats (PostScript font) 51, 53
zapfchan (package) 79
\Zborder (▭) 56
\zeta (ζ) 34
\zetaup (ζ) 35
\Zodiac 48
zodiacal symbols 48
\Ztransf (●⟝○) 27
\ztransf (○⟞●) 27
\zugzwang (⊙) 60
\Zwdr (𝅘𝅥𝅯) 57
\ZwPa (𝅘𝅥𝅰) 57