Quantifiers

Note Title 21/11/2005

- dotdotdot notation

  $1 + 2 + \ldots + 10$

- Σ, Π notation

  $$\sum_{k=1}^{10} k$$

- systematic notation

  $\langle \Sigma k : 1 \leqslant k \leqslant 10 : k \rangle$

$\langle \forall k : 0 \leqslant k < a.length : a[k] = 0 \rangle$

"for all"

means $(a[0] = 0) \wedge (a[1] = 0) \wedge \ldots \wedge (a[a.length - 1] = 0)$

$\langle \exists k : 0 \leqslant k < a.length : a[k] = 0 \rangle$

"there exists"

means $(a[0] = 0) \vee (a[1] = 0) \vee \ldots \vee (a[a.length - 1] = 0)$

$\langle \oplus k : R : T \rangle$

Key:	
$\langle\ \rangle$	delimit scope of dummy
$\oplus$	quantifier
k	dummy
R	range
T	term

Examples

s	student
m	module
takes (s, m)	
mark (s, m)	

No. of students taking mcs.

Average mark of students taking mcs.

Lowest mark in mcs.

Every student who takes mcs also takes aps

There is a student who is not taking aps
who is taking mcs.

Progression Rules for Honours Students

Module ave.	*Pass credits*	*Hard-Fail*	*Status*
n/a	120	n/a	progress
$\geqslant 40$	$\geqslant 80$	0	progress
$\geqslant 50$	$\geqslant 100$	n/a	progress

credit.m no. of credits for module m

pass(s,m) = (mark(s,m) $\geqslant$ 40)