1,

(a) 123 = 01111011
(b) 64 = 01000000
(c) 127 = 01111111
(d) 43 = 00101011
(e) -123 = 10000101
(f) -64 = 11000000
(g) -127 = 10000001
(h) -43 = 11010101

2,

(a) 123 - 127 = 01111011 - 01111111 = 01111011 + 10000001 = 11111100
(b) -123 - 127 = 10000101 - 01111111 = 10000101 + 10000001 = 00000110 (overflow)
(c) 64 - 43 = 01000000 - 00101011 = 01000000 + 11010101 = 00010101
(d) 43 - 43 = 00101011 - 00101011 = 00101011 + 11010101 = 00000000
(e) 127 - 123 = 01111111 - 01111011 = 01111111 + 10000101 = 00000100

3,

(a) $9 = (1.001)_2 \times 2^3$

sign bit =0
exponent code 01111111+00000011=10000010
mantissa code 0010000 00000000 00000000
IEEE754 single precision format: 41100000H

(b) $5/32 = (1.01)_2 \times 2^{-3}$

sign bit = 0
exponent code 01111111+ 11111101 = 01111100
mantissa code 0100000 00000000 00000000
IEEE754 single precision format: 3E200000H

(c) $-5/32 = -(1.01)_2 \times 2^{-3}$

sign bit =1
exponent code 01111111+ 11111101 = 01111100
mantissa code 0100000 00000000 00000000
IEEE754 single precision format: BE200000H

(d) $6.125 = (0110.001)_2 = (1.10001)_2 \times 2^2$

sign bit =0
exponent code 01111111+00000010=10000001
mantissa code 1000100 00000000 00000000
IEEE 754 single precision format: 40C40000

4,
(a) 42E48000H= 01000010 11100100 10000000 00000000
sign bit=0
exponent = 133 = 127 + 6
mantissa = $(1.11001001)_2$ the value in decimal notation = $(1.11001001)_2 \times 2^6 = 114.25$

(b) 3F880000H = 1.0625

(c) 00800000H = 0.0

(d) C7F00000H = -122880.0

5,
3EE00000H = 00111110 11100000 00000000 00000000
the exponent is 01111101

3D800000H = 00111101 10000000 00000000 00000000
the exponent is 01111011 = 01111101 - 00000010
the difference between the exponents is 2, align the significant of 3D800000H,
it becomes 00111110 10100000 00000000 00000000
the sum is 00111111 00000000 00000000 00000000 =3F000000H

6,
(a) 125.25 – 75.5
125.25 = $(1.11110101)_2 \times 2^6$ to represent it in IEEE 754 format
sign bit=0
exponent code 10000101
mantissa code 1111010 10000000 00000000

75.5 = $(1.0010111) \times 2^6$ to represent it in IEEE 754 format
sign bit=0
exponent code 10000101
mantissa code 0010111 00000000 00000000

their exponents are equal, the subtraction between mantissa is
1.11110101 – 1.0010111 = 0.11000111 = $(1.1000111)_2 \times 2^{-1}$
after normalization, the final result is 0 10000100 1000111 00000000 00000000 =42470000H

(b) 123.125 – 43.5

$123.125 = (1.111011001)_2 \times 2^6$ to represent it in IEEE 754 format

sign bit=0
exponent code 10000101
mantissa code 1110110 01000000 00000000

$43.5 = (1.010111)_2 \times 2^5$ to represent it in IEEE 754 format

sign bit=0
exponent code 10000100
mantissa code 0101110 00000000 00000000

since their exponents are different, to operate subtraction between them, mantissa alignment is needed

$43.5 = (1.01011)_2 \times 2^5 = (0.1010111)_2 \times 2^6$

the mantissa subtraction 1.111011001 – 0.1010111 = 1.001111101

it is normalized format, the final result is 0 10000101 0011111 01000000 00000000
= 429F4000H

7,

the real value here is Y=+0.4
X will be the representation of Y in specifically defined floating format
Here exponent length is 4 bits, significant(mantissa) length is 7 bits.
We will represent Y by X as shown in the following:

$Y = +0.4 = +(0.0110011001100...)_2 = +(1.10011001100...)_2 \times 2^{-2}$

sign bit=0
exponent code 0111- 0010 =0101
significant code 1001100
for the 12-bit floating representation of Y is 0 0101 1001100
so, X = 0 0101 1001100 = 2CCH

the value of X according to such floating format is $(1.1001100)_2 \times 2^{-2}$ =0.3984375

therefore, the relative error is expressed as

$R = (Y - X)/Y = (0.4 - 0.3984375)/0.4 = 0.00390625$