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Hw comp Arch 1

①

Product	Multiplicand	Multiplier	Description	Step
00000000	0000 1011	1010	Initial Values	Step 0
0000 0000	0000 1011	1010	1: 0 → no operation	step 1
0000 0000	000 10110	1010	2: shift left Multiplicand	step 2
0000 0000	00 10110	0101	3: shift right multiplier	step 3
00010110	00010110	0101	1a: 1 → Prod = Prod + Mcand	step 4
000 10110	00 10110 0	0101	2: shift left Multiplicand	step 5
000 10110	00 10110 0	0010	3: shift right multiplier	step 6
000 10110	0010 1100	0010	1: 0 → no operation	step 7
00010110	01011000	0010	2: shift left multiplicand	step 8
00010110	01011000	0001	3: shift right multiplier	step 9
01101110	01011000	0001	1a: 1 → prod = prod + Mcand	step 10
01101110	10110000	0001	2: shift left multiplicand	step 11
01101110	10110000	0000	3: shift right multiplier	step 12

② ⓑ 1 01111101 00100000000000000000000

1 → negative decimal

$2^{-3} = \frac{1}{8}$

$(01111101)_2 =$

128	64	32	16	8	4	2	1
0	1	1	1	1	1	0	1

$64 + 32 + 16 + 8 + 4 + 1 = 125$

e = Negative

$125 - 127 = -2 = e$

$(-1)^1 \cdot (1 + \frac{1}{8}) \cdot 2^{-2} = -\frac{1}{4}(1\frac{1}{8}) = -0.28125$

③ $\frac{0}{0}$, $\infty - \infty$, $\frac{3}{0}$, $\frac{\infty}{\infty}$

exponent

③ ① (9)(1)0.0011011

matisa

0001.1011

$1.1011 \cdot 2^{-3}$

↓

S = 0

E = -3+7 = 4 $(0100)_2$

M = 1011 → Rounding out = 1100 = 110

S	E	M
0	0100	110

② 16.0

10000.0

$1.0 \cdot 2^4$

S = 0

E = 4+7 = 11 = $(1011)_2$

M = 0

S	E	M
0	1011	000

⑥ 1 1010 101

S E M

S = 1

E = 1010 → 10-7 = 3 $(0011)_2$

M = 101 → $2^{-1}+2^{-3} = \frac{1}{2}+\frac{1}{8} = \frac{5}{8}$

$(-1)^1 \cdot (1+\frac{5}{8}) \cdot 2^3 = -13$

⑥ (1) 0 0100 100

(2) 1 1100 101

⑦ 1 00000000 00000000000000000000

⑧ 0 11111111 00000000000000000000

④ ② ① 1.0

↓

$001.0 \cdot 2^0$

S = 0

E = 0 − 4 = 4 $(100)_2$

M = 000

0 100 000

② 0.0011011

↓

S = 0 $1.1011 \cdot 2^{-3}$

E = −3 + 4 = 1 $(001)_2$

M = 1011

0 001 1011

⑤ 1 01111110 01100000000000000000000

⑥ 0 00000001 11111111111111111111111

(7) (a) 00001000

11110111
+ 1
11111000 → 2's complement

+ 00001000
+ 11111000
00001000

(b) 128 64 32 16 8 4 2 1
0 0 1 0 0 1 0 0

11011011
+ 1
11011100 ← 2's complement

+ 00100100
+ 11011100
00000100

(c) finds the distance of the number from base 2 bit number.