

MIPS Floating Point Quiz

Gene Haen

1.575

$$5 = 2^0 + 2^2 = 101$$

$$.75 = 2^{-1} + 2^{-2} = .11$$

$$= 101.11_7$$

63/64

left side = 0 because value < 1

$$\frac{C_3}{64} = \frac{32}{64} + \frac{16}{64} + \frac{8}{64} + \frac{4}{64} + \frac{2}{64} + \frac{1}{64}$$

$$2^{-1} \quad 2^{-2} \quad 2^{-3} \quad 2^{-4} \quad 2^{-5} \quad 2^{-6}$$

$$1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1$$

2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}
1	1	1	1	1	1

1 1 1 1 1 1

$$= 0.111111$$

9. 8125

left side = 9

$$9 = 2^0 + 2^3 = 1001$$

right side = 8129

$$= 0.5 + 0.25 + 0.0625$$

$2^{-1} \quad 2^{-2} \quad 2^{-4}$

11. 1101

$$= 1001.1101_2$$

2. 34.890625

Sign bit is positive = 0

Convert 34 to binary = $2^5 + 2^1 = 100010$

Convert .890625 to binary = $0.5 + 0.25 + 0.125 + 0.015625$

$$2^{-1} \quad 2^{-2} \quad 2^{-3} \quad 2^{-6} = .111001$$

100010.111001

Move decimal 5 to the left

Exponent is 5 \rightarrow in binary $5 = 101$

0 0000101 001011100100000000000000

Sign Exponent 8 bits Mantissa 23 bits

Sign

Exponent
8 bits

Manitissa 23 bits

3. 0 0111011 All zeros
 sign Exponent Mantissa

Sign is 0 so it is positive

Exponent \rightarrow convert to decimal

$$\begin{aligned} 0111011 &= 2^0 + 2^1 + 2^3 + 2^4 + 2^5 + 2^6 \\ &= 1 + 2 + 8 + 16 + 32 + 64 \\ &= 123 \end{aligned}$$

$$123 - 127 = -4$$

Mantissa is all 0's so there is no fractional portion

$$1.0 \times 2^{-4} = 0.0001 = 0.0625_{10}$$

4. A denormalized number can have any sign bit.

The exponent must be 0 and the mantissa cannot be 0.

Largest denormalized number

0 0000 11111111
 Sign Exponent Mantissa

Smallest Normalized Number

0 0001 00000000
 Sign Exponent Mantissa