

# Rushma Basnet Thapa

## Quiz

1a) 5.75

Binary 101.110

$$\begin{array}{r|l} 2 & 5 \\ \hline 2 & 2 \quad 1 \\ \hline & 1 \quad 0 \end{array}$$

$$\begin{array}{r|l} & .75 \\ \hline 1 & 50 \\ \hline 1 & 0 \end{array}$$

⑤

Multiply by 2

$$63/64 = 0.984$$

$$0.984 \times 2 = 1.968$$

$$0.968 \times 2 = 1.936$$

$$0.936 \times 2 = 1.872$$

$$0.872 \times 2 = 1.744$$

⑥

$$9.8125$$

$$1001.1101$$

$$0.774 \times 2 = 1.488$$

$$0.488 \times 2 = 0.976$$

$$0.976 \times 2 = 1.952$$

$$0.952 \times 2 = 1.904$$

$$0.904 \times 2 = 1.808$$

$$0.808 \times 2 = 1.616$$

$$= \boxed{0.11110111}$$

$$\begin{array}{r|l} 2 & 9 \\ \hline 2 & 4 \quad 1 \\ \hline 2 & 2 \quad 0 \\ \hline & 1 \quad 0 \end{array}$$

$$\begin{array}{r|l} & 8125 \\ \hline 1 & 6250 \\ \hline 1 & 250 \\ \hline 0 & 50 \\ \hline 1 & 0 \end{array}$$

(2)

$$34.890625$$

$$100010.111001$$

$$1.00010111001 \times 2^5$$

$$E_x = 5 + 127 = 132$$

S → true

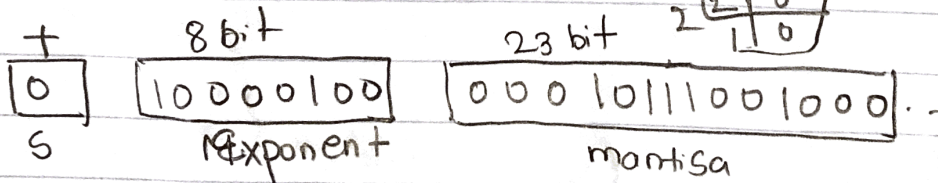
$$10000100$$

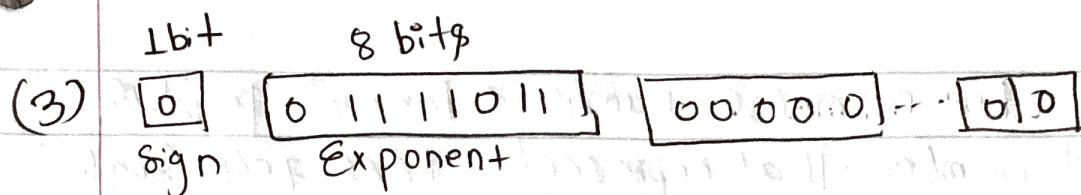
$$M = 10000100$$

$$\begin{array}{r|l} 2 & 34 \\ \hline 2 & 17 \quad 0 \\ \hline 2 & 8 \quad 1 \\ \hline 2 & 4 \quad 0 \\ \hline 2 & 2 \quad 0 \\ \hline & 1 \quad 0 \end{array}$$

$$\begin{array}{r|l} & 890625 \\ \hline 1 & 781250 \\ \hline 1 & 56250 \\ \hline 1 & 1250 \\ \hline 0 & 250 \\ \hline 0 & 50 \\ \hline 1 & 0 \end{array}$$

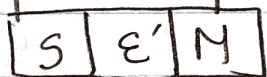
$$\begin{array}{r|l} 2 & 32 \\ \hline 2 & 16 \quad 0 \\ \hline 2 & 8 \quad 0 \\ \hline 2 & 4 \quad 0 \\ \hline 2 & 2 \quad 0 \\ \hline & 1 \quad 0 \end{array}$$





→ To convert binary to decimal value we use the step where we see sign 0 is positive and if there was 1 the sign would be negative, we move the decimal value to left until we get last single bit. the number will represent the exponent. Then we have to add to the bias for ex (any exp + 127) and we convert it to decimal the rest will be mantissa.

#### 4) Floating point representation



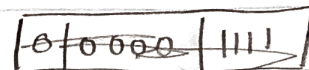
where S = sign

$E' = \text{Biased Exponent} (E' = E + \text{Bias})$

M = Mantissa (Normalization)

A floating point number is denormalized if the exponent field contains all 0's & fraction field doesn't have 0. In that case we just assume exponent to be the smallest value & don't assume 1 at mantissa.

Smallest mantissa = 1.0000



7 Smallest positive normalized number & largest positive denormalized number that represent IEEE 754 single precision floating.

Smallest representative positive number

$$2^{-7} = \frac{1}{128}$$

Here bit pattern (0000 0000)

Largest representative

It is negative number

$$-2^{-7} = -\frac{1}{128}$$

(10000000)

|       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|
| $2^7$ | $2^6$ | $2^5$ | $2^4$ | $2^3$ | $2^2$ | $2^1$ | $2^0$ |
| 128   | 64    | 32    | 16    | 8     | 4     | 2     | 1     |