

CS 286-002 Computer Architecture & Organization

Fall 2026

Quiz #6 on October 7, 2026 (SOLUTIONS)

Your Last Three Digits: _____

(please do NOT write all of your student ID or your name)

Grade: _____

- (1) Show the binary bit pattern for $+65.625_{(10)}$ in (the complete) IEEE-754 format. Show your work.

$$65.625 = 64 + 1 + (1/2) + (1/8) = 1000001.101$$

$$= 1000001.101 \times 2^0$$

$$= 1.010001101 \times 2^6$$

The exponent bits (in the bias of 127):

0: 01111111

6: 00000110

10000101

Exponent Bits: 10000101

Significand: 0100 0110 1000 0000 0000 000

Sign: 0

- (2) What does “normalization” in IEEE-754 standard mean?

By adjusting the exponent (i.e., ‘x’ of “ 2^x ”), we have exactly one ‘1’ above the decimal point.

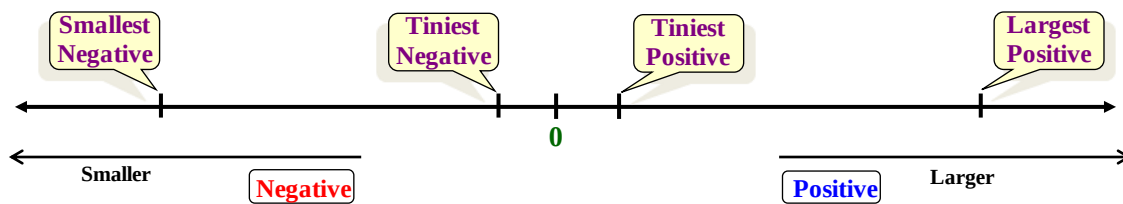
- (3) What is the advantage of using “normalized” format in IEEE-754 standard?

Processors have one additional bit in the significand bits (i.e., the 23 significand bits work as if they were 24 significand bits).

OR

Processors can represent more numbers accurately.

- (4) Show the binary bit patterns for the tiniest positive number in IEEE-754 floating point numbers.



Exponent Bits: 0000 0001

Significand Bits: 0000 0000 0000 0000 0000 000

Sign Bit: 0

- (5) Show the binary bit patterns for the smallest negative number in IEEE-754 floating point numbers).

Exponent Bits: 1111 1110

Significand Bits: 1111 1111 1111 1111 1111 111

Sign Bit: 1