The following is a list of possible questions for our quiz on September 19th. Some of the questions will not be asked in the quiz. All the questions that will appear in the quiz will appear exactly as shown below (however, numeric parameters may be changed). The quiz is closed textbook, closed notes and closed neighbors. Note that the questions, which did not appear in this quiz, still may appear in the exams. You will find a solution for these questions during lectures.

#1: What is the problem in representing fractions using the “fixed-point” method?

The range of the numbers that can be represented is very limited.

#2: What does “floating point” in “floating point fraction numbers” mean?

We can move the decimal point in either left right (as you wish).

#3: What are the three components in the floating-point number expressions?

Sign
Mantissa (significand)
Exponent

#4: Show (by an example) how a floating-point number expression can represent a huge number.

\[+9.67 \times 10^{125}\]

#5: Show (by an example) how a floating-point number expression can represent a tiny number.

\[+9.67 \times 10^{-225}\]

#6: What is “0.01011_(2)” in the decimal format? Show your work.

\[0.01011_(2) = (0 \times 1/2) + (1 \times 1/4) + (0 \times 1/8) + (1 \times 1/16) + (1 \times 1/32)\]

\[= 0.25 + 0.0625 + 0.03125\]

\[= 0.34375\]

#7: What is the binary bit pattern of +12_(10) in the bias of 127? Assume that the bit pattern consists of 8 bits. Show your work.
#8: In IEEE-754 floating-point number standard, how “0” is represented?

#9: In IEEE-754 floating-point number standard, if all the “exponent bits” are “1” (i.e., eight “1”’s), what can it mean?

#10: Translate \(262.75_{(10)}\) in the normalized binary format. Show your work.

#11: What does “normalization” in IEEE-754 standard mean?

#12: What is the advantage of using “normalized” format in IEEE-754 standard?

#13: Show the binary bit pattern for \(262.75_{(10)}\) in IEEE-754 format. Show your work.

#14: Show the binary bit patterns for the tiniest positive number in IEEE-754 floating point numbers.

#15: Show the binary bit patterns for the tiniest negative number in IEEE-754 floating point numbers (for the definition of “the tiniest negative”, use the definition in #25).

#16: Show the binary bit patterns for the largest positive number in IEEE-754 floating point numbers (for the definition of “the tiniest positive”, use the definition in #25).

#17: Show the binary bit patterns for the smallest negative number in IEEE-754 floating point numbers (for the definition of “the smallest negative”, use the definition in #14).

Note: For questions #15 through #17 above, the following figure will be provided in your quiz question sheet:
#18: What are the five different types of the numbers IEEE-754 floating-point numbers that can not be accurately represented by a processor?

**Note:** This question does not ask descriptions of the five different types of the numbers. Instead, it asks the name of the five different types of the numbers.