CS 286-002 Computer Architecture & Organization
Fall 2017
Quiz #3 on September 13, 2017 (SOLUTIONS)

Your Last Three Digits: ________________
(please do NOT write all of your student ID or your name)

Grade: ______

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(1) “li $t1, $t0” is an illegal instruction (if you try to assemble that instruction using PC-SPIM simulator, that instruction will cause a syntax error). What’s wrong?

“li” instructions means “load immediate”. It requires an immediate (a “hard-coded” constant number) for its second parameter. Thus, “$t0” can not be at the second parameter (since it is a register).

(2) What are the three components in the floating-point number expressions?

The sign
The exponent
The significand

(3) What is “0.1011(2)” in the decimal format? Show your work.

\[
= 2^1 + 2^3 + 2^{-4} \\
= (1/2) + (1/8) + (1/16) \\
= 0.5 + 0.125 + 0.0625 \\
= 0.6875
\]
(4) What is the binary bit pattern of \(-2_{(10)}\) in the bias of 127? Assume that the bit pattern consists of 8 bits. Show your work.

\[
\begin{array}{c}
0: 0111 1111 \\
- 2: 0000 0010 \\
\hline
0111 1101
\end{array}
\]

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

By normalizing the significand bits, we get one extra bit at the end of the 23 significand bits (i.e., the 23 significand bits actually work as 24 significand bits after the normalization).