CS 286-002 Computer Architecture & Organization
Fall 2017
Quiz #2 on September 6, 2017 (SOLUTIONS)

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

Grade: ______

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(1) What does the following 16-bit two’s complement number mean in the decimal format? Show all your work.

“1 0 0 1 1 0 1 1 0 0 1 0 0 1 0 1”

= (-2^{15}) + 2^{12} + 2^{11} + 2^{9} + 2^{8} + 2^{5} + 2^{2} + 2^{0}

= (-32768) + 6949

= -25818

(2) How will “-1_{(10)}” be represented using \(n\)-bits two’s complement number?

\(n\) 1’s
(3) Complete the following figure by specifying number systems we discussed in the classroom.

(4) How are registers in processors used when a binary executable program is executed?

Registers are the space (hardware space) inside a processor, which a processor uses to hold data for processing those data using ALU.

(5) What is the difference between “li $a0, 1024” and “la $a0, 1024” instructions? Assume that this computer system is a 32-bit system (i.e., all the registers are 32-bit registers and its ALU can deal with up to 32-bit inputs and outputs).

“li $a0, 1024” encodes “1024” to a binary bit pattern based on two’s complement integer, while “la $a0, 1024” does so based on unsigned integer.