

CS 286-001 Computer Architecture & Organization
Fall 2026

Quiz #4 on September 23, 2026 (**SUGGESTED SOLUTIONS**)

Your Last Three Digits: _____

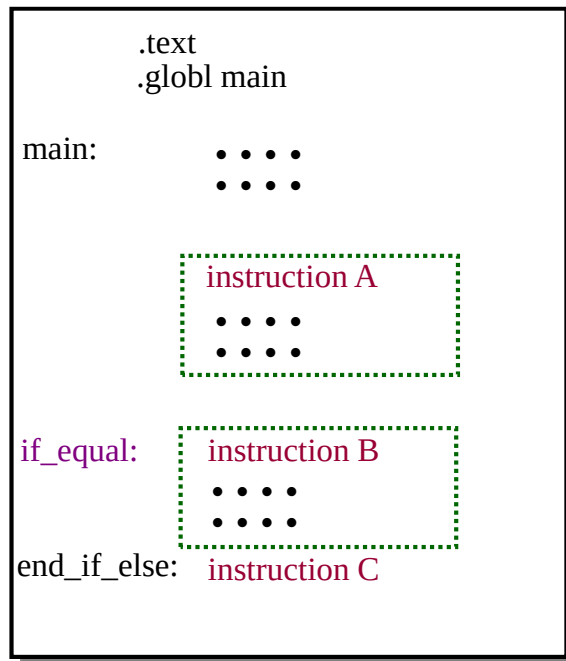
(please do NOT write all of your student ID or your name)

Grade: _____

(1) What is the essential difference between “lw” instruction and “la” instruction?

- lw instruction is a memory-access instruction. It goes to a location (address) in the memory and grabs the contents at the memory address and load (copy) it to a register.
- la instruction is NOT a memory-access instruction. It takes a constant value hard-coded in a la instruction and it loads the constant value to a register as an unsigned integer.

(2) Translate the “if-then-else” program structure using MIPS instructions (in the following MIPS assembly program structure (by showing all the necessary missing instructions there).



The most serious problem is that we need a ‘j’ instruction at the end of the group of “instruction A” (“j end_if_else”).

- (3) What does the following 16-bit two's complement number mean in the decimal format? Show your calculation.

“1 0 1 0 1 0 0 0 0 0 1 1 0 1 0 1”

$$= (-2^{15}) + (2^{13} + 2^{11} + 2^5 + 2^4 + 2^2 + 2^0)$$

$$= (-32768) + (8196 + 2048 + 32 + 16 + 4 + 1)$$

$$= -22475 \text{ (minus 22475)}$$

- (4) What does “floating point” in “floating point fraction numbers” mean?

The term, “floating point” means that the decimal point can move either to the left or the right).

- (5) How will “-1₍₁₀₎” be represented using n -bits two's complement number?

n ‘1’s