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**CS 331 COMPUTER ORGANIZATION AND ARCHITECTURE**

**Spring 2023 – Homework 3**

1. Bits have no inherent meaning. Given the 32-bit pattern:

**1010 1101 0001 0000 0000 0000 0000 0100**

What does it represent, assuming it is …

1. A 2's complement signed integer?
2. A MIPS instruction? [10 pts]
3. Add comments to the following MIPS code and describe in one sentence what it computes. Assume that $a0 is used for the input and initially contains n, a positive integer. Assume that $v0 is used for the output.

**begin: addi $t0, $zero, 0**

**addi $t1, $zero, 1**

**loop: slt $t2, $a0, $t1**

**bne $t2, $zero, finish**

**add $t0, $t0, $t1**

**addi $t1, $t1, 2**

**j loop**

**finish: add $v0, $t0, $zero [10 pts]**

1. What is the decimal value of the following single-precision floating-point numbers?
   1. **1010 1101 0001 0100 0000 0000 0000 0000** (binary)
   2. **0100 0110 1100 1000 0000 0000 0000 0000** (binary) [10 pts]
2. (10 pts) Single-precision float-point numbers, and are as follows:

*x* = **1100 0110 1101 1000 0000 0000 0000 0000** (binary) and

*y* = **0011 1110 1110 0000 0000 0000 0000 0000** (binary)

Perform the following operations showing all work:

* 1. x + y
  2. x \* y [10 pts]

1. Implement the following C code in MIPS assembly. Show the contents of the stack after the function call to the function “compare” is made.

**int compare (int a, int b) {**

**if (sub (a, b) >= 0) return 1;**

**else return 0;**

**}**

**int sub (int a, int b) {**

**return a – b;**

**} [20 pts]**

**Submission:**

**Submit the word document containing your responses for Q1 to 4, and a MIPS Assembly File named ID\_Q5.asm as one zip file named ID\_hw3.zip.**