**COSC 2325 Computer Organization**

**Assignment 7**

**Due: 23:59:00, Oct. 24, 2022 (Monday)**

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**L20498001**

1. Memory at 0x10000000 contains 0x80 and Register $5 contains 0x10000000. What is put in register

$8 after the instruction below is executed? (20 points)

**lb $8,0($5)**

Since the lb instruction stores the register $5 value 0x80 (off + base = 0 + $5 = 0 + 0x10000000 = 0x10000000 ---> 0x80), $8 now holds 0x80.

1. Please explain why a branch delay slot is needed for jump instruction. (20 points)

Since MIPS is pipelined, it can fetch several sequential instructions. Because of this, the instruction after the jump instruction is mostly already completed. To not waste this effort, MIPS completes the following instruction and then does the jump instruction to maximize efficiency. Hence, the instruction directly following the jump instruction is called the branch delay slot, and its purpose is to maximize efficiency.

1. The machine language form of a jump instruction (j) is 00001001001100101000110001010111.

The address of the jump instruction (PC) is 0x20221020. What address this the program will jump to? (40 points)

PC : 0x20221020

2 = 0010

0010 0100 1100 1010 0011 0001 0101 11 + 00

= 0010 0100 1100 1010 0011 0001 0101 1100

* 0x24CA315C

1. Please complete the following *if-then-else* structure. The code is to compare $10 and $11. If these registers contain the same bit pattern, set register $7 to 1. Otherwise set $7 to 0. (20 points)

**ori $10, $0, 123**

**ori $11, $0, 123**

**beq $10, $11,equal**

**sll $0, $0, 0 ori $7, $0, 0 j join**

**sll $0, $0, 0**

**equal: ori $7, $0, 1**

**join: .....**