

CENG 3420 Quiz 1

Name: _____

ID: _____

Q1 Consider three different processors P1, P2, and P3 executing the same instruction set with the clock rates and CPIs given in the following table.

| Processor | Clock Rate | CPI |
|-----------|------------|-----|
| P1 | 2 GHz | 0.8 |
| P2 | 3 GHz | 1.2 |
| P3 | 4 GHz | 1.8 |

1. Which processor has the highest performance expressed in instructions per second?
2. If the processors each execute a program in 10 seconds, find the number of cycles and the number of instructions.

Q2 Dividing 1001011 by 1001

Q3 In a **Big Endian** machine, given the following code sequence and memory state:

```

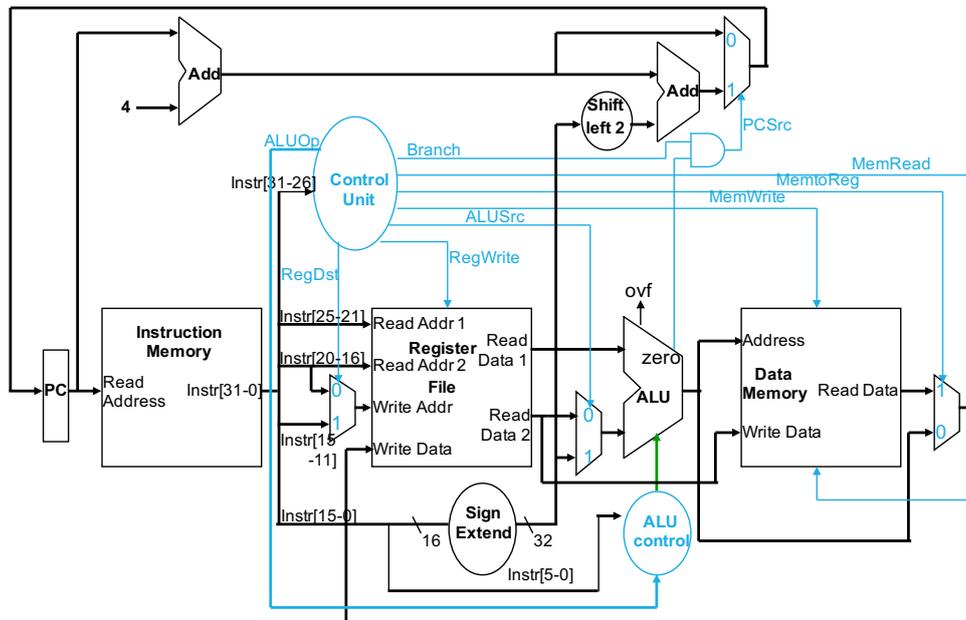
add $s2, $zero, $zero
lb  $t0, 2($s2)
sb  $t0, 5($s2)

```

| Memory | |
|------------|----|
| 0x00000000 | 24 |
| 0x00000000 | 20 |
| 0x00000000 | 16 |
| 0x10000010 | 12 |
| 0x01000402 | 8 |
| 0xFFFFFFFF | 4 |
| 0x009012A0 | 0 |
| Data | |

1. What value is left in $\$t0$?
2. What word is changed in Memory and to what?
3. What if the machine was **Little Endian**?

Q4 Given following datapath, provide the control signal for R-type instruction (in the following table). Branch & ALUOp signals have been in the table.



| RegDst | ALUSrc | MemReg | RegWr | MemRd | MemWr | Branch | ALUOp |
|--------|--------|--------|-------|-------|-------|--------|-------|
| | | | | | | 0 | 10 |