

Score: _____ Name: _____

ECE 3055 Quiz 2 – Spring 2011

The following RISC assembly language program is executed on a MIPS processor. Fill in the register values that will be present, after execution of this program. A summary of MIPS instructions is included at the bottom of the page – for anyone unfamiliar with the MIPS instruction set. Prior to execution of the program, memory location 0x01000 contains 0xF0862031. Note: 0x indicates hexadecimal and all answers must be in hexadecimal, default is decimal in the MIPS assembly language source file. A MIPS memory word or register contains 32-bits. Use XXXXXXXX for an undefined value.

```
        LW      $3, 0x01000
        SLL    $4, $3, 3
        SUB    $3, $3, $4
        AND    $2, $3, $4
        LUI    $5, 0x3055
        ORI    $5, $5, 100
        ADD    $6, $2, $3
        BNE   $6, $2, LABEL1
        ADDI   $6, $0, -1
LABEL1:  SW     $6, 0x01000
```

After execution of the MIPS code sequence above,

R2 = 0x 04110086 (in hexadecimal)

R3 = 0x 6C551EA9 (in hexadecimal)

R4 = 0x 84310188 (in hexadecimal)

R5 = 0x 30550064 (in hexadecimal)

Memory Location 0x01000 contains: 0x 70661F31 (in hexadecimal)

The MIPS processor contains thirty-two 32-bit registers, \$0 through \$31. \$0 always contains a zero. By default, all arithmetic operations use two's complement arithmetic. Assume no branch delay slot is present.

<i>MIPS Instruction</i>	<i>Meaning</i>
ADD Rd, Rs, Rt	- Rd = Rs + Rt (R – register (\$))
AND Rd, Rs, Rt	- Rd = Rs bitwise logical AND Rt (R – register (\$))
ORI Rd, Rs, <i>Immed</i>	- Rd = Rs bitwise logical OR <i>Immediate</i> value
LUI Rd, <i>Immed</i>	- Rd = 16-bit <i>Immediate</i> value high 16-bits, 0's low 16-bits
BLT Rs, Rt, <i>address</i>	- Branch to <i>address</i> , only if Rs less than Rt
LW Rd, <i>address</i>	- LOAD - Rd gets contents of memory at <i>address</i>
SLL Rd, Rs, <i>count</i>	- Shift left logical (<i>use 0 fill</i>) by <i>count</i> bits
SUB Rd, Rs, Rt	- Rd = Rs - Rt
SW Rd, <i>address</i>	- STORE - memory at <i>address</i> gets contents of Rd
XOR Rd, Rs, Rt	- Rd = Rs bitwise logical XOR Rt