

Score: _____ Name: _____

ECE 3055 A Quiz 1 – Spring 2004

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 0x0400 contains 0x30552030. Note: 0x indicates hexadecimal and all answers must be in hexadecimal. A MIPS memory word or register contains 32-bits.

```

                LW          $3, 0x0400
                SLL        $4, $3, 8
                OR         $2, $3, $4
                AND        $3, $4, $3
                LUI        $5, 0x2030
                ORI        $5, $5, 63
                SUB        $6, $4, $3
                BNE        $3, $6, LABEL1
                ADDI       $6, $0, -4
LABEL1:        SW         $6, 0x0400
    
```

After execution of the MIPS code sequence above,

R2 = 0x 75753030 (in hexadecimal)

R3 = 0x 10002000 (in hexadecimal)

R4 = 0x 55203000 (in hexadecimal)

R5 = 0x 2030003F (in hexadecimal)

Memory Location 0x0400 contains: 0x 45201000 (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.

<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 = <i>Immediate</i> value high 16-bits, 0's low 16-bits
BEQ Rs, Rt, <i>address</i>	- Branch to <i>address</i> , only if Rs equal to 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