EGC442   Problem Set 6   Dr. Izadi

First Name:_____ Last Name: _____

1) Given the following initial value, determine the resulting value for the given operation.
0011 0000 0000 0000 0000 0000 1111 0001

- **Shift right by 8**
- **Shift left by 8**
- **Shift left by 2**
- **Multiply by 2**

0000 0000 0000 0000 1111 0001 0000 0000

0000 0000 0011 0000 0000 0000 0000 0000

1100 0000 0000 0000 0000 0011 1100 0100

0110 0000 0000 0000 0000 0001 1110 0010

2) Given the following initial values, determine the resulting value for the given operation.
x: 0011 0000 0000 0000 0000 0000 1111 0001
y: 0000 0000 0000 0000 0000 0000 1111 1111

- **x AND y**
- **x OR y**
- **x NOR y**
- **NOT x**

0000 0000 0000 0000 0000 0000 1111 0001

0011 0000 0000 0000 0000 0000 1111 1111

1100 1111 1111 1111 1111 1111 0000 1110

1100 1111 1111 1111 1111 1111 0000 0000

3) AND can be used to mask out particular bits (forcing those bits to 0's).
○ True
○ False

4) OR can be used to set particular bits to 1.

○ True

○ False

5) Goal: Force the rightmost bit of $s3 to be 1.
   _____ $s3, $s3, 1

○ andi

○ ori

6) Goal: Invert every bit of $s3. Ex: If $s3 is 1010…1010, make $s3 0101…0101.
   _____ $s3, $s3, _____

○ ori / $zero

○ nor / $zero

7) To isolate bits 7..4 in the rightmost 4 bits of a 32-bit word, one can first shift left 24 bits, then right _____ bits.

○ 24

○ 28

8) Goal: multiply $s2 by 8.
   sll $s2, $s2, _____

○ 3

○ 8

Assume $s1 has 50 and $s2 has 30. Given this code:

        bne $s3, $s4, Else

        add $s0, $s1, $s2

        j   Exit

Else: sub $s0, $s1, $s2

Exit:

9) What is "bne" short for?

○ branch equal

○ branch not equal

○ be nice everyone

10) If $s3 is 9 and $s4 is 9, which instruction executes after bne?

○ add

○ sub

11) j Exit is executed when $s3 and $s4 values _____.

○ are equal

○ are not equal

12) If the first instruction were beq rather than bne, what instruction should then appear immediately after beq?

○ add $s0, $s1, $s2

○ sub $s0, $s1, $s2

13) Given the C statement "if (i == j) f = g + h", what instruction is needed (assuming variables are mapped to registers properly)?

       _____ $s3, $s4, Exit
       add $s0, $s1, $s2

Exit:

○ bne

○ beq

14) Given the C loop: while (x != y) { ... }. != means not equal, and assume $s0 is x and $s1 is y. Complete the compiled loop:

       Loop: _____ $s0 $s1 Exit
       # Loop body
             j   Loop
       Exit:

○ beq

○ bne

15) Given: for (i = 0; i < 9; ++i) { ... } where i is $s0. Which comparison instruction is most appropriate?

○ slt $t0, $s0, 9

○ slti $t0, $s0, 9

○ slti $t0, $s0, 0

16) Given: for (i = 50; i > 10; --i) { ... } where i is $s0. Which comparison instruction is most appropriate?

○ slti $t0, 10, 50

○ slti $t0, 10, $s0

○ None of the above

17) Given: for (i = 1; i < j; ++i) { loop body } where i is $s0, j is $s1. Complete the indicated instruction:

Loop: slt $t3, $s0, $s1
     _____ $t3, $zero, Exit
Loop body
       j   Loop
Exit:

○ beq

○ bne

○ slti

18) What does slt stand for?

○ shift on less than

○ set on lowly triumph

○ set on less than

Assume $s0 has the binary number 1111 0000 0000 0000 0000 0000 0000 1111$_{two}$ and $s1 has the binary number 0000 0000 0000 0000 0000 0000 0000 1111$_{two}$.

19) What is the value of $t0 after the following instruction?

slt $t0, $s0, $s1

○ 1$_{ten}$

○ 0$_{ten}$

20) What is the value of $t0 after the following instruction?

sltu $t0, $s0, $s1

○ 1$_{ten}$

○ 0$_{ten}$

21) Assume the values in $s0 and $s1 are signed binary numbers, and $s1 is positive. Complete the following code to jump to L2 if the bounds check $0 \leq \$s0 < \$s1$ fails.

_____ $t0, $s0, $s1
beq $t0, $zero, L2

○ sltu

○ slt