

Name:

Id#

**ICS 233, Term 081**

**Computer Architecture & Assembly Language**

**Quiz# 3**

Date: Wednesday, Nov. 26, 2008

**Q.1.** Consider the definitions given in the data segment below. Determine what is printed by each of the following sequence of MIPS instructions:

.data

Msg1: .ascii "Welcome to "

Msg2: .ascii "ICS "

X: .byte 0x32, 0x33, 0x33, 0

1. la \$a0, Msg1

li \$v0, 4

syscall

2. la \$a0, X

lb \$a0, (\$a0)

li \$v0, 1

syscall

3. la \$a0, X+1

lb \$a0, (\$a0)

li \$v0, 11

syscall

**Q.2.** Determine the output produced by the following program. What functionality is the code implementing?

```

1.    li    $a0, 21
2.    li    $a1, 14
3.    jal   myfunction
4.    addu  $a0, $v0, $zero
5.    li    $v0, 1
6.    syscall
7.    j end
myfunction:
8.    bnez  $a1, else
9.    addu  $v0, $zero, $a0
10.   jr    $ra
else:
11.   addiu $sp, $sp, -4
12.   sw    $ra, ($sp)
13.   addu  $t0, $zero, $a0
14.   addu  $a0, $zero, $a1
15.   remu  $a1, $t0, $a1    # $a1= $t0 % $a1 (i.e. remainder)
16.   jal   myfunction
17.   lw    $ra, ($sp)
18.   addi  $sp, $sp, 4
19.   jr    $ra
end:

```

Syscall Services		
Service	\$v0	Arguments / Result
Print Integer	1	\$a0 = integer value to print
Print String	4	\$a0 = address of null-terminated string
Print Char	11	\$a0 = character to print