Name: KEY **Id#**

ICS 233, Term 072

Computer Architecture & Assembly Language

Quiz# 4

Date: Wednesday, April 2, 2008

Q.1. Write the **minimum** required MIPS instructions to do the following:

1. Push the content of register $s1 on the stack.

```
addiu   $sp,$sp,-4
sw      $s1, ($sp)
```

2. Pop the content of register $s2 from the stack.

```
lw      $s2, ($sp)
addiu   $sp,$sp,4
```

Q.2. Write the **minimum** required MIPS instructions to implement the following recursive function:

t(0)= 0
t(n)= 2+ 3*t(n-1);

```
fun:

        bne     $a0,$0,else     # if false branch to else
        li      $v0,0           # $v0 = 0
        jr      $ra             # return to caller
else:
        addiu   $sp,$sp,-4      # allocate a word on stack
        sw      $ra,0($sp)      # save return address
        addiu   $a0,$a0,-1      # argument = n-1
        jal     fun             # call fun(n-1)
        lw      $ra,0($sp)      # restore return address
        sll $t0, $v0, 1         # $v0 =3*fun(n-1)
        addi $v0, $v0, $t0
        addi $v0,$v0, 2         # $v0 =2+3*fun(n-1)
        addi $sp,$sp,4          # free stack frame
        jr      $ra             # return to caller
```