Name: KEY   **Id#**

ICS 233, Term 141

Computer Architecture & Assembly Language

Quiz# 4

Date: Tuesday, Nov. 18, 2014

Q1. Determine the content of register $v0 after executing the following code:

        li $a0, 0x12340000
        jal MyProc

MyProc:
        or $v0, $0 ,$0
        ori $t0, $0, 8
loop:
        rol $a0, $a0, 4
        andi $t1, $a0, 0xf
        add $v0, $v0, $t1
        addiu $t0, $t0, -1
        bne $t0, $0, loop
        jr $ra

        The procedure adds the number of hexadecimal digits and stores the result in register $v0.
        Thus $v0=1+2+3+4=0xA.

Q2. Assuming that functions F and G receive two integer arguments in $a0 and $a1 and return their results in $v0, implement the function F given below saving needed registers on the stack. Save changed registers according to the assumed programming convention:

```
int F(int a, int b) {
      return  G(2a,b)+G(a,2b);
}
```

```
F:      addiu  $sp, $sp, -16   # frame = 16 bytes
        sw      $ra, 0($sp)       # save $ra
        sw      $a0, 4($sp)       # save argument a
        sw      $a1, 8($sp)       # save argument b
        shl     $a0, 1            # $a0 = 2*$a0
        jal     G                 # call G(2a,b)
        sw      $v0, 12($sp)     # save result of  call G(2a,b)
        lw      $a0, 4($sp)      # $a0 = a
        lw      $a1, 8($sp)      # $a0 = b
        shl     $a1, 1            # $a1 = 2*$a1
        jal     G                 # call G(a,2b)
        lw      $v1, 12($sp)     # restore result of  call G(2a,b)
        addu    $v0, $v0, $v1    # $v0 = G(2a,b)+G(a,2b)
        lw      $ra, 0($sp)       # restore $ra
        addiu  $sp, $sp, 16     # free stack frame
        jr      $ra
```