Name: Id#

COE 301/ICS 233, Term 172

Computer Architecture & Assembly Language

Quiz# 2 Solution

Date: Thursday, Feb. 22, 2018

# **Q1.** Fill in the blank in each of the following questions:

## Assuming 12-bit unsigned number representation, the binary number 1111 1111 0000 is equal to the decimal number 4080

## Assuming 16-bit signed 2`s complement representation, the hexadecimal number FEA0 is equal to the decimal number -352.

## The pseudo instruction *li $t0, 0x12345678* is implemented by the following minimum MIPS instructions:

## lui $t0, 0x1234

## ori $t0, $t0, 0x5678

## The pseudo instruction *neg $s2, $s1* ($s2 is computed as the negative value of $s1) is implemented by the following minimum MIPS instructions:

## sub $s2, $zero, $s1

## The pseudo instruction *rol $s0, $s0, 4* ($s0 is rotated to the left by 4 bits and stored in $s0) is implemented by the following minimum MIPS instructions:

## srl $at, $s0, 28

## sll $s0, $s0, 4

## or $s0, $s0, $at

## Assuming that $a0 contains an Alphabetic character, the instruction andi $a0, $a0, 0xDF will make the character stored in $a0 always upper case. Note that the ASCII code of character ‘A’ is 0x41 while that of character ‘a’ is 0x61.

## Assuming the following data segment, and assuming that the first variable X is given the address **0x10010000**, then the addresses for variables Y and Z will be 0x10010006and 0x10010010.

## .data

## X: .byte 10, 11, 12, 13, 14

## Y: .half 15, 16, 17, 18

## Z: .word 19, 20

## To multiply the **signed** content of register $t0 by 112 without using multiplication instructions, we use the following minimum MIPS instructions (HINT: 112=16\*7):

## sll $t1, $t0, 4

## sll $t0, $t1, 3

## sub $t0, $t0, $t1

## To allocate 10 words, each initialized by 0, we use the following assembler directive .word 0:10.

## The MIPS system call for printing a string given below prints the following:

*Quiz#2*

*COE 301/ICS 233 is easy !!*

## *Note that the ASCII code for the line feed character is 10 and the ASCII code for the carriage return character is 13.*

*MSG: .ascii "Quiz#2 "*

*.byte 10*

*.ascii "COE 301/ICS 233 "*

*.asciiz "is easy !! "*

*li $v0, 4*

*la $a0, MSG*

*syscall*