جامعة الملك فهد للبترول والمعادن
King Fahd University of Petroleum & Minerals

Quiz 2 (Fall 2022) - Solution

Course Name: Computer Organization **Time: 20 mins**

Instructor: Dr. Ayaz ul Hassan Khan

Name: _____ Identification #: _____
Date: _____ Total Marks: 10 Marks Obtained: _____
Signature of Instructor: _____

Q#1: Given that **$t0 = 0XD114F6F1** and **$t1 = 0XCA90A0ED** are two **signed** integers, compute the following. [6 marks]

Instruction	Value computed (hexadecimal)
add $t2, $t0, $t1	$t2 = 0x9BA597DE Overflow (Yes / No)? NO
sub $t3, $t0, $t1	$t3 = 0x06845604 Overflow (Yes / No)? NO
sra $t4, $t1, 8	$t4 = 0XFFCA90A0

Show the addition / subtraction in hexadecimal and indicate whether there is overflow.

```
 1     1  1                          1    1111
   D114F6F1          D114F6F1          D114F6F1
 + CA90A0ED        - CA90A0ED        + 356F5F13  (2's compliment)
 ----------------                    ----------
   9BA597DE                          06845604
```

Q#2: Write MIPS code fragment that computes $t1 = ($t0 x 90), using minimum number of shift and add/sub instructions [4 marks]
Hint: 90 = 10 x 9 = (8+2) x (8+1)

```
sll  $t1, $t0, 3      # $t1 = $t0*8
sll  $t2, $t0, 1      # $t2 = $t0*2
addu $t0, $t1, $t2 # $t0 = $t0*(8+2)
sll  $t1, $t0, 3      # $t1 = $t0*(8+2)*8
addu $t1, $t1, $t0 # $t1 = $t0*(8+2)*(8+1)
```