COMPUTER ARCHITECTURE & ASSEMBLY LANGUAGE
14:332:331
Rutgers University
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Quiz 1 Solution

1. Assuming A and are two integer arrays. The base address of A and B are in register $s0 and $s1, respectively. Assume that variables i and j are in $s2, and $s3 respectively, what is the MIPS assembly code for the following C statement? (Use only true instructions)

B[i-3]=A[3j-i]-6;

```
addi $t0, $s2, -3       #i-3
add $t1, $s3, $s3
add $t1, $t1, $s3       #3j
sub $t2, $t1, $s2       #3j-i
sll $t0, $t0, 2         #4*( i-3)
sll $t2, $t2, 2         #4*(3j-i)
add $t2, $t2, $s0       #address A[3j-i]
lw $t3, 0($t2)          #load A[3j-i]
addi $t4, $t3, -6       # A[3j-i] - 6
add $t0, $t0, $s1       # address B[i-3]
sw $t4, 0($t0)
```

2. Consider the following code sequence and memory state (memory contents are given in hexadecimal. Other values are in decimal). Assume that the machine is **Little Endian**. Show the **contents of memory** as well as the value stored in **$t1** and **$t2** after running this code. Show the value in **HEX**.

```
addi    $s2, $zero, 14          #$s2 = 14
lui     $s3, 24                 #$s3 = 24 * 2^16 = 0x00180000
srl     $t1, $s3, 4             #$t1 = 0x00018000 =
        0b0000_0000_0000_0001_1000_0000_0000_0000
lw      $t0, 2($s2)             #$t0 = 0x7E1565A9 =
        0b0111_1110_0001_0101_0110_0101_1010_1001
and     $t2, $t0,t1             #$t2 = 0x00010000
sb      $t2, 10($s2)            #mem[24] changes to 22310100
```

17FD25EC	28
223101BA	24
18926163	20
7E1565A9	16
7701BAC7	12
00011110	8
01BAC789	4
0100FACE	0

22310100

Memory address (Decimal)