

**COMP 122/L**  
**Summer 2023**

**Memory-based Instructions in MIPS Assembly**

1.) What does the following program print?

```
.data
variables:
    .word 6, 8

.text
main:
    la $t0, variables # $t0: pointer to variables
    lw $a0, 0($t0)
    li $v0, 1
    syscall
    lw $a0, 4($t0)
    li $v0, 1
    syscall
```

2.) What does the following program print?

```
.data
some_data:
    .word 5, 2, 7, 1

.text
main:
    li $t0, 4          # $t0: number of remaining elements
    la $t1, some_data # $t1: pointer to current element
loop:
    lw $a0, 0($t1)
    li $v0, 1
    syscall
    addiu $t1, $t1, 4
    addiu $t0, $t0, -1
    bne $t0, $zero, loop
```

3.) What will the `result` array hold at the end of this program's execution?

```
.data
result:
    .word 0, 0, 0

.text
main:
    li $t0, 2      # $t0: current computed value
    li $t1, 3      # $t1: number of remaining elements
    la $t2, result # $t2: pointer to current element
loop:
    sw $t0, 0($t2)
    multu $t0, $t0
    mflo $t0
    addiu $t1, $t1, -1
    addiu $t2, $t2, 4
    bne $t1, $zero, loop
```

4.) What will the `result` array hold at the end of this program's execution?

```
.data
result:
    .word 1, 2, 3, 4, 5, 6

.text
main:
    li $t0, 3      # $t0: number of remaining elements
    la $t1, result # $t1: pointer to first element
    la $t2, result
    addiu $t2, $t2, 20 # $t2: pointer to last element
loop:
    lw $t3, 0($t1) # $t3: leftmost temp
    lw $t4, 0($t2) # $t4: rightmost temp
    sw $t3, 0($t2)
    sw $t4, 0($t1)
    addiu $t1, $t1, 4
    addiu $t2, $t2, -4
    addiu $t0, $t0, -1
    bne $t0, $zero, loop
```