

CS240

## Lab 11 Assignment

Due: Wednesday, before lab

A program accepts an unspecified number of integer inputs, keeps track of how many entries are made, and calculates a running sum of the entries. When a value of '0' is entered by the user, the program outputs the results.

Here is a sample of the program output given the inputs 1 - 5:

```
Enter an integer: 1
Enter an integer: 2
Enter an integer: 3
Enter an integer: 4
Enter an integer: 5
Enter an integer: 0
```

```
The number of entries = 5
The sum = 15
```

The program is on the next page. Read it, and answer or do the following:

1. Add comments to the program to explain how it works.

2. Is this program recursive? Why?

3. Are there any variables stored in the data section (other than prompt strings)? Where are the count of inputs and the running total accumulated? (hint: not in the registers)

4. What registers are used to pass parameters to the `getvalue` procedure?

5. What registers are used to return results to the main program?

6. How many times and with what parameter values is the `getvalue` procedure invoked for the sample inputs 1 2 3 4 5 0?

(in pseudocode)

`getvalue(0,0)` ;first call to `getvalue` from the main program, with parameters 0,0

`getvalue(1,1)` ;next call, when the 1 is entered

show all the other calls for the sample inputs 1 2 3 4 5 0:

```

        .text
        .globl main

main:    li $a0,0
        li $a1,0
        jal getvalue
        move $t0,$v0

        li $v0,4
        la $a0,prompt2
        syscall
        li $v0,1
        move $a0,$t0
        syscall

        li $v0,4
        la $a0,prompt3
        syscall
        li $v0,1
        move $a0,$v1
        syscall

        li $v0,10
        syscall

getvalue: addi $sp,$sp,-12
        sw $ra,8($sp)
        sw $a1,4($sp)
        sw $a0,0($sp)

        la $a0,prompt1
        li $v0,4
        syscall
        li $v0,5
        syscall
        move $t0,$v0

        bne $t0,$0,more
        lw $v0,0($sp)
        ls $v1,4($sp)
        j done

more:    lw $a0,0($sp)
        lw $a1,4($sp)
        add $a1,$a1,$t0
        addi $a0,$a0,1
        jal getvalue

done:    lw $a0,0($sp)
        lw $a1,4($sp)
        lw $ra,8($sp)
        addi $sp,$sp,12

        jr $ra

```

.data

prompt1: asciiz "\nEnter an integer: "  
prompt2: .asciiz "\nThe number of entries = "  
prompt3: .asciiz "\nThe sum = "