

Lab 11

1. jump.s

Int Regs [16]		Console
PC	= 400080	I'm stuck in a loop!
EPC	= 0	I'm stuck in a loop!
Cause	= 0	I'm stuck in a loop!
BadVAddr	= 0	I'm stuck in a loop!
Status	= 3000ff10	I'm stuck in a loop!
HI	= 0	I'm stuck in a loop!
LO	= 0	I'm stuck in a loop!
R0 [r0]	= 0	I'm stuck in a loop!
R1 [at]	= 10010000	I'm stuck in a loop!
R2 [v0]	= a	ELSE!
R3 [v1]	= 0	You called a function!
R4 [a0]	= 10010022	
R5 [a1]	= 7ffff568	
R6 [a2]	= 7ffff570	
R7 [a3]	= 0	
R8 [t0]	= 0	
R9 [t1]	= 0	
R10 [t2]	= 0	
R11 [t3]	= 0	
R12 [t4]	= 0	
R13 [t5]	= 0	
R14 [t6]	= 0	
R15 [t7]	= 0	
R16 [s0]	= 1	
R17 [s1]	= 0	
R18 [s2]	= 0	
R19 [s3]	= 0	
R20 [s4]	= 0	
R21 [s5]	= 0	
R22 [s6]	= 0	
R23 [s7]	= 0	
R24 [t8]	= 0	
R25 [t9]	= 0	
R26 [k0]	= 0	
R27 [k1]	= 0	

- a.
2. My code will need to define a bunch of variables, including the array itself, the length of the array, a few blank variables to hold the sum and average. Then a few labels to define the sum and average as well as a new line. As for the code itself, I will assign various variables to registers, and then start a loop that will iterate through the array, adding each element to the sum. Then I will loop through until the i matches the length. After that I will print out the results, printing the label needed, then the correct variable to correspond to it and close the file.

3. Assembly Code

```
1  # Program header
2  # arrAvg.s
3  # Performs the average of an array
4  # Zach Healy
5
6  # data section
7  .data
8      arr:    .word 13, 15, 17, 19, 22, 43, 45, 87, 99, 199
9      len:    .word 10
10     sum:    .word 0
11     avg:    .word 0
12     sLab:    .ascii "Sum: "
13     aLab:    .ascii "Average: "
14     nLine:   .ascii "\n"
```

a.

```
17  # code section
18  .text
19  .globl main
20
21  main:
22      la $s1, arr #arr
23      li $s2, 0 #sum
24      lw $s3, len #length
25      li $s4, 0 #i = 0
26      Loop:
27          lw $s5, 0($s1) #loads the array[i]
28          add $s2, $s2, $s5 #Calculate sum
29
30          add $s4, $s4, 1 #Iterate I
31          add $s1, $s1, 4
32          blt $s4, $s3, Loop
33
34      sw $s2, sum
35
36      #print out sum Label
37      li $v0, 4
38      la $a0, sLab
39      syscall
40
41      #print out sum
42      li $v0, 1
43      move $a0, $s2 #moves s2 to a0 for printing
44      syscall
45
46      #print out new Line
47      li $v0, 4
48      la $a0, nLine
49      syscall
50
51      #print out average Label
52      li $v0, 4
53      la $a0, aLab
54      syscall
55
56      #print out average
57      li $v0, 1
58      div $a0, $s2, $s3
59      mflo $a0
60      syscall
61
62  #ends code
63      li $v0, 10
64      syscall
```

b.

4. Output

 Console

```
Sum: 559  
Average: 55
```

a.