

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. `ALL KNOWN REGISTER`

2. Psudocode

- a. Define variables
- b. Assign variables to array
- c. Start loop
- d. Assign current array element to \$s5
- e. Add \$s5 to the sum (\$s2)
- f. Iterate the count variable + 1
- g. Iterate array to get ready for next element
- h. Compares the count variable to the length variable
 - i. If the count is greater than or equal to, stop
 - ii. If the count is less than, loop again
- i. Print out label for Sum
- j. Print out sum value
- k. Print out new line
- l. Print out label for average
- m. Calculate average
- n. Print out average
- o. Close 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.