**Computer Architecture Theory + Lab (CS 305/341)**

**Assignment 4: MIPS ISA** Due Date: 22/09/20

(Theory Assignment 2)

1. What are the MIPS instructions or instruction sequences corresponding to each of the following pseudoinstructions?

subi, li, mov, la, beqz, , ble, bleu, seq

seq stands for “set if equal to”

Figure these out yourself, then use the SPIM simulator to verify your answer. Note that there may be multiple answers to each of the above.

1. What is the machine code corresponding to each of the following instructions/pseudoinstructions?

(Answer should be in hex).

sub $t0, $t7, $s5

andi $5, $s5, 89

sll $s4, $s4, 3

bge $s4, $t1, 300

lb $s0, 100($t1)

Figure these out yourself, then use the SPIM simulator to verify your answer.

1. Study the following program carefully, then answer the questions below.

.data

arr: .space 100

.text

.globl main

main: li $t0, 0

li $t1, 0

li $t4, 0

li $t5, 4

li $s0, 1

li $s1, 1

li $s3, 6

sw $s1, arr($t1)

go: addi $t1, 4

sw $s1, arr($t1)

addi $t1, 4

sw $s1, arr($t1)

here: addi $t1, 4

lw $t6, arr($t4)

lw $t7, arr($t5)

L1: add $t6, $t6, $t7

sw $t6, arr($t1)

addi $t4, 4

addi $t5, 4

addi $t0, 1

bne $t0, $s0, here

L2: addi $s0, $s0, 1

addi $t4, 4

addi $t5, 4

li $t0, 0

bne $s0, $s3, go

j $ra

* The machine code corresponding to the instruction at label L1 is

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (put answer in hex) .

* The number of times the instruction at label L1 is executed is \_\_\_\_\_\_\_\_ .
* The number of times the instruction at label L2 is executed is \_\_\_\_\_\_\_\_ .
* Upon program termination, the content of array, arr is

\_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_

\_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_ \_\_\_

* The content of register t4 is \_\_\_\_\_\_\_\_ .
* The content of register t6 is \_\_\_\_\_\_\_\_ .

Figure these out yourself, then use the SPIM simulator to verify your answer