

CS224
Fall 2020
QUIZ NO. 2

October 21, 2020

PLEASE READ: 1. Only handwritten answers are accepted. 2. Convert your handwritten answers to pdf and upload one pdf file to Moodle. Make sure that you answer the questions in the order they are given. Provide a neat work and make sure that your answers are numbered and in the order of questions and distinguishable from each other. Do not miss the deadline.

Note: Quiz questions indicate nothing about the difficulty of the exam questions.

1. Consider the following code segment which does not do anything sensible.

```
label1:    add    $t0, $t1, $t2                                .data
label2:    la     $t2, sum                                     array1: .word 10, 20, 30
          lw     $t3, 4($t2)                                array2: .space 16
          ble    $t3, $t2, label1                           sum: .space 4
          j      label2
```

Give the machine instruction(s) generated for the code segment in a tabular form as show below.
Show your work.

Assume that label1 is defined at memory location 0x004000CC. The contents of the data segment of this program is given above. Assume that the data segment starts at memory location 0x0010010C. If more than one machine instruction is generated for a given instruction explain why briefly and give the machine instructions for all.

Symbolic Machine Instruction	Machine Instruction(s)
add \$t0, \$t1, \$t2	
la \$t2, sum	
lw \$t3, 4(\$t2)	
ble \$t3, \$t2, label1	
j label2	

2. Give the implementation of the following pseudo instructions in terms of real MIPS instructions. The first row provides an example. If not possible explain why.

Instruction	Explanation	Implementation
move \$t0, \$t1	Move contents of \$t1 to \$t0	add \$t0, \$t1, \$zero
invert \$t1	Complements \$t1	
sw 4, 0(\$t0)	Stores the constant 4 to the memory	
lwinc \$t1, 0(\$t0)	Gets content from memory increments it by 1 and loads into \$t1	
swap \$t1, \$t2	\$t1 <==> \$t2	
Bgezero \$t1, label	if \$t1 is greater than or equal to zero branch to label	

3. Write a code segment that will exchange the data fields of the list head and list tail. For example if the linked list contains the following values in sequence 1, 2, 3, 4 after executing the subprogram it contains 4, 2, 3, 1. Note that linked list can be empty. In this linked list structure we first have the data field which is 16 bytes then it is followed by the link field. Implement it in the way that comes easy to you. If you use a subprogram you have to provide its implementation.
4. Give the single precision and double precision IEEE 754 floating point number representation for the following numbers. Show your work.
 - 1024.5₁₀
 - 42B.44₁₆

Consider the following numbers expressed in hexadecimal the first one is a single precision number and the second one is a double precision number (IEEE 754 representation). Give their decimal representations. Show your work.

0x42B44000
0x405F700000000000