Last NAME: *Quiz 2 , March 23, 20222* *First Name:*

Computer Science
C.Sc. 342

Quiz No.2 To be performed

5:00-6:15 PM on March 23, 2022

Submit by 6:15 PM 03/23/2022on Slack to Instructor

Please write your Last Name on every page:

NO CORRECTIONS ARE ALLOWED IN ANSWER CELLS!!!!!

You may use the back page for computations.

Please answer all questions. **Not all questions are of equal difficulty.**

Please review the entire quiz first and then budget your time carefully.

Please hand write and sign statements affirming that you will not cheat:

"I will neither give nor receive unauthorized assistance on this exam.
I will use only one computing device to perform this test"

Please hand write and sign here:

This quiz has 6 pages.

Question	Your Grade	Max Grade
1.1		5
1.2		10
1.3		10
1.4		10
2.1.1		15
2.1.2		15
2.1.3		15
2.2.1		5
2.2.2		5
2.2.3		5
2.3		5

Total: 100

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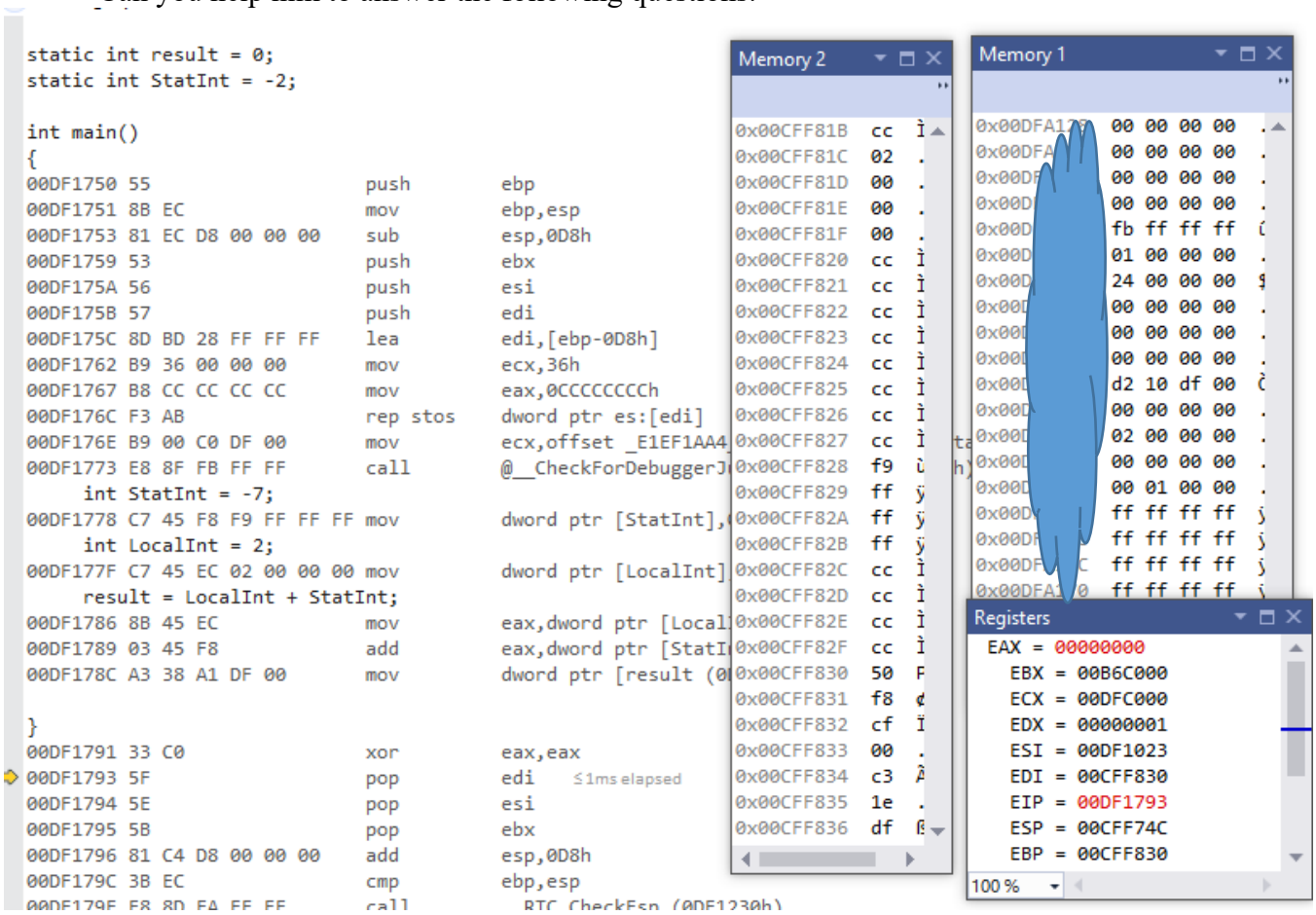
Question 1.

A student, while debugging his program, unintentionally displayed partially corrupted DISSASSEMBLY windows in MS Visual Studio Debug environment.
He was able to display correctly Register window, and two Memory windows.
His task was to determine addresses of variables in the expression
result = LocalInt + StatInt in Memory at the instance of the snapshot.
He is not allowed to restart the debug session.
Can you help him to answer the following questions:



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1.1 [5 points] What is the address of the instruction that will be executed next instance?

1.2 [10 points] Can you determine the address of variable **StatInt** in the expression? **YES or NO.**
*Please circle around your answer***. IF** *No is your answer, then go to the next question*
ELSE *Please compute the address of variable* ***StatInt*** *in memory ,*
and determine the value of variable StatInt you can read from memory:
Address of ***StatInt*** *is …….*
Value of ***StatInt*** *in memory is*
Please justify your answers.

1.3 [10points] Can you determine the address of variable **LocalInt** in the expression? **YES or NO.**
*Please circle around your answer***. IF** *No is your answer, then go to the next question*
ELSE *Please compute the address of variable* ***LocalInt*** *in memory ,*
and determine the value of variable ***LocalInt*** *you can read from memory:*
Address of ***LocalInt*** *is ……..*
Value of ***LocalInt*** *in memory is….*
Please justify your answers.

1.4 [10 points] Can you determine the address of variable **result** in the expression? **YES or NO.**
*Please circle around your answer***. IF** *No is your answer, then go to the next question*
ELSE *Please compute the address of variable* **result** *in memory ,*
and determine the value of variable **result** *you can read from memory:*
Address of **result** *is …….*
Value of **result** *in memory is*
Please justify your answers.

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Question 2.

A student wrote MIPS assembly program and executed it in MARS simulator.

```
 .data
array1:  .word -1,0x7fffffff,0x10000080,0x80000010
.text
    main:
                la $t1,array1
# create Frame pointer
                    add $fp,$zero,$sp
#Store the address of the first element on stack
using frame pointer
                    sw $t1,0($fp)
#allocate memory on Stack for 6 integers
            addi $sp,$sp,-24
#load FIRST element from array1[0] to register $s0
            lw  $s0,0($t1)
#push $s0 (NO PUSH!)i.e. store  register $s0
on #top of the stack
            sw  $s0,0($sp)
#load SECOND element from array1[1] to register $s0
            lw  $s0,4($t1)
#create new top of the stack
            addi $sp,$sp,-4
            sw  $s0,0($sp)
            #
 #load third element from array1[2] to register
 $s0
            lw  $s0,8($t1)
 #create new top of the stack
            addi $sp,$sp,-4
            sw  $s0,0(sp)
 #load forth element from array1[3] to register
 $s0
            lw  $s0,12($t1)
  #create new top of the stack
            addi $sp,$sp,-4
            sw  $s0,0($sp)
```

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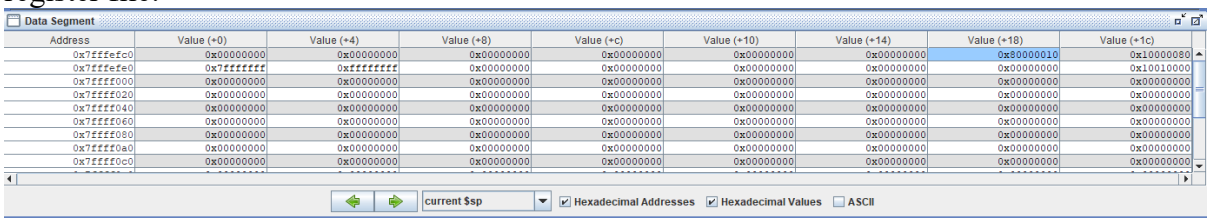
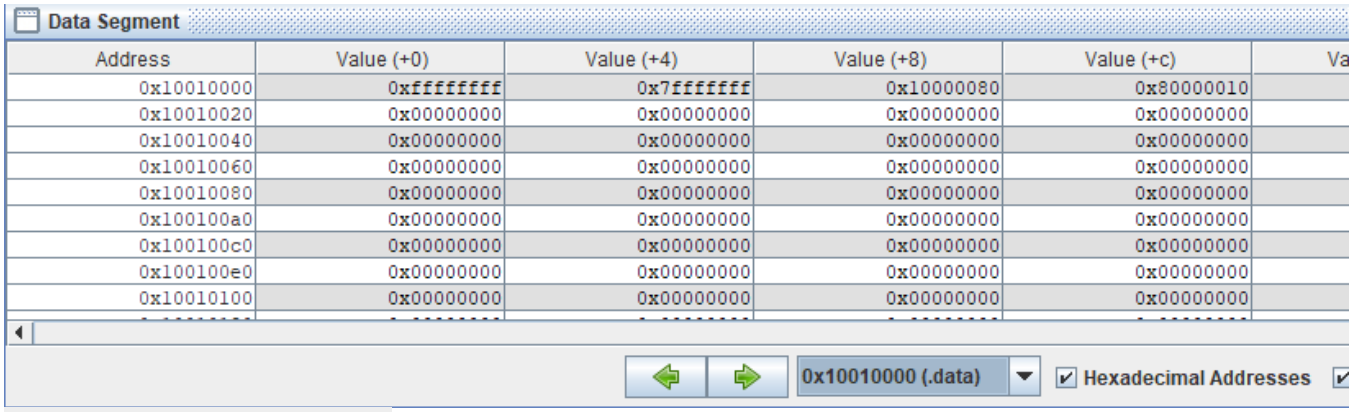
After execution of the program in MARS simulator, he displayed the following memory windows and register file:





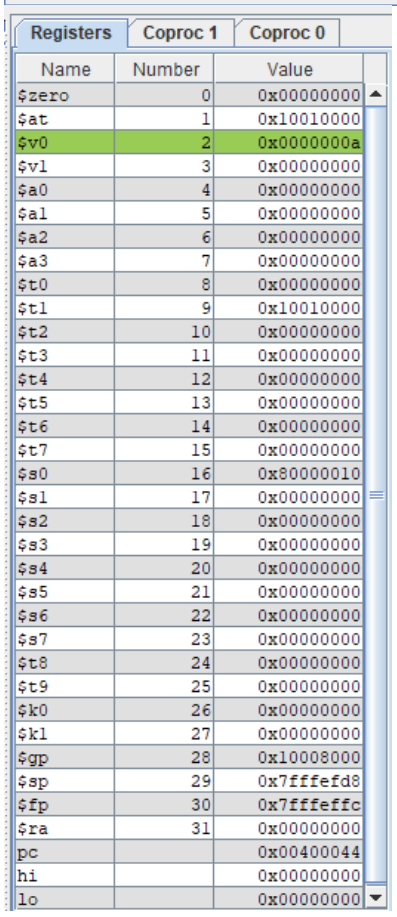


Figure 2. Register file and memory windows in MARS simulator.

Based on the information displayed in **Figure 2.** memory windows and register file above, please answer the following questions

2.1.1 [15 points] What is the address of an integer that was **first** pushed on to stack?

2.1.2 [15 points] What is the value in Hex and signed decimal of an integer that was **first** pushed on to stack?

2.1.3 [15 points] What is the offset from FRAME POINTER to an integer that was **first** pushed on to stack?

2.2.1 [5 points] What is the address of an integer that was **Last** pushed on to stack?

2.2.2 [5 points] What is the value in Hex and signed decimal of an integer that was **Last** pushed on to stack?

2.2.3 [5 points] What is the offset from FRAME POINTER to an integer that was **Last** pushed on to stack?

2.3 [5 points] Based on the data shown Figure 2.,Can you determine if Frame pointer points to an **address** *or a* **value?** Please circle around your answer.
Please explain.