

Al-Isra University

Faculty of IT

Department of Computer Science



جامعة الإسرائ

كلية تكنولوجيا المعلومات

قسم هندسة البرمجيات

<u>Department:</u> SE	<u>Assignment:</u> #3	<u>Submission Deadline:</u> 05/06/2023
<u>Semester:</u> Summer	<u>Year:</u> 2022/2023	<u>Instructor</u> Dr. Dimah Fraihat
<u>Course No.:</u>	<u>Course Name:</u> Computer Design and Organisation	<u>Section:</u> <u>1</u>
<u>Student No.:</u>	<u>Student Name:</u> <u>حمزة مسلم</u>	<u>Submission date:</u>

Question No.	Mark	
	Max	Score
1	2	
2. a	1	
2. b	1	
2. c	1	
Total Mark	5	

Note: 1- Copy and paste are prohibited

Q1) Translate the following C statement into MIPS assembly code.

Assume that x, y, z, q are stored in registers \$s1-\$s4 respectively.

You may use the other registers to hold intermediate results

$x = x + y + z - q;$

Solution:

Load the values of x, y, z, and q into temporary registers

lw \$t0, 0(\$s1) # \$t0 = x

lw \$t1, 0(\$s2) # \$t1 = y

lw \$t2, 0(\$s3) # \$t2 = z

lw \$t3, 0(\$s4) # \$t3 = q

Perform the arithmetic operations

add \$t4, \$t0, \$t1 # \$t4 = x + y

add \$t5, \$t4, \$t2 # \$t5 = x + y + z

sub \$t6, \$t5, \$t3 # \$t6 = x + y + z - q

Store the result back into register \$s1 (x)

sw \$t6, 0(\$s1) # x = \$t6

Q2) Use the register and memory values in the tables below for the next questions. Assume a 32-bit machine. Assume each of the following questions starts from the table values; that is, DO NOT use value changes from one question as propagating into future parts of the question.

Register	Value
\$1	12
\$2	16
\$3	20
\$4	24

Memory Address	Value
12	16
16	20
20	24
24	28

- a. Give the values of registers \$1, \$2, and \$3 after this instruction is executed: add \$3, \$2, \$1

$\$1 = 12$ (remains unchanged)

$\$2 = 16$ (remains unchanged)

$\$3 = \$2 + \$1 = 16 + 12 = 28$

- b. Give the values of registers \$1 and \$3 after this instruction is executed: lw \$3, 12(\$1).

$\$1 = 12$ (remains unchanged)

$\$3 = \text{Memory}[12 + \$1] = \text{Memory}[12 + 12] = \text{Memory}[24] = 28$

- c. Give the values of registers \$2 and \$3 after this instruction is executed: addi \$2, \$3, 16

$\$2 = \$3 + 16 = 28 + 16 = 44$

$\$3 = 28$ (remains unchanged)