**(Exercise 1)** We have a hypothetical computer with this instruction format:

| OP_CODE | OPERAND 1 | OPERAND 2 |
|---|---|---|
| 4 BITS | 4 BITS | 4 BITS |

| | |
|---|---|
| 0000 | 0xC2 |
| 0001 | 0x19 |
| 0010 | 0x5A |
| 0011 | 0x2 |
| | |
| | |
| ... | |

*Figure 1. Memory (address and content)*

SUM Rx, Ry 1001xxyy Add RX+RY and it is stored in RX.

Following the instruction sequence:

**100100010010 -> 1001 0001 0010**

**OP_CODE: 1001**

**OPERAND_1: 0x19 = 0000 0001 1001**

**OPERAND_2: 0x5A = 0000 0101 1010**

**SUM Rx, Ry: 00011001 + 01011010 = 01110011 -> 0x73**

Add RX+RY and it is stored in RX. In 0001 there were: 0x19.

If we store the value of adding RX + RY it will remain: 0x73

a) **What is the result after executing this instruction?** 0x73

**b) Which will be the state of the memory after the execution of this instruction?**

| | |
|---|---|
| 0000 | 0xC2 |
| 0001 | 0x73 |
| 0010 | 0x5A |
| 0011 | 0x2 |

**c) Which is the addressing mode used in both operands?** I think it's about the relative.

d) **What would be the result if operand 2 uses immediate addressing mode?**

**OPERAND_2:** 0010**.**

**In 0010: 0x5A ->** 0000 0101 1010

**(Exercise 2)** We have a computer with this instruction set:

| Code | Instrucction | Description |
|---|---|---|
| ENT M(m) | 000mmmmm | Read data from keyboard to memory. |
| SAL M(m) | 001mmmmm | Show data on screen from memory. |
| CAR R0, M(m) | 010mmmmm | Store content a memory address in register R0. |
| ALM M(m), R0 | 011mmmmm | Store content of R0 in a memory address. |
| MOV Rx, Ry | 1000xxyy | Copy content of RY to RX **(X, Y are register numbers).** |
| SUM Rx, Ry | 1001xxyy | Add RX+RY and it is stored in RX. |
| RES Rx, Ry | 1010xxyy | Subtract RX-RY and it is stored in RX. |
| MUL Rx, Ry | 1011xxyy | Multiply RX * RY and it is stored in RX. |
| DIV Rx,Ry | 1100xxyy | Divide RX / RY and it is stored in RX. |

Following the instruction sequence:

**00001011(A)**

**00001100(B)**

**00010001(C)**

**00011100(D)**

**01001011 10000100 01011100 10001100 01010001 10001000 10111110 10101101 01001100 10001000 10011110 01010001 10001000 11001110 10000011 01101101 00101101**

Where A, B, C, D represents the input using the keyboard and their values are: A=1

B=2
C=3
D=4

e) What is the formula associated to A, B, C, D?

f) What is the result shown on screen?

g) What is the state of memory?

h) If Program Counter (PC) initial value was 258… Which is it actual value?

i) How many registers of general purpose (RX) has our architecture?

**Share your solution and your doubts in the forum!!! If a classmate has problems with it, try to help him.**