

## Problem 5

Given a processor with the operation ADD OP1, OP2 on two explicit operands, performing  $OP1 \leftarrow OP1 + OP2$

The format of the instruction is 16 bits according to

Opcode 0110	OP1	OP2
4 bits	6 bits	6 bits

Addressing mode of both operands is equal. Given the memory positions in the table, PC=0 and the base register contains a 5. Consider the first instruction and give in the table where the result is written and which value is written in hexadecimal for the given addressing modes. For the notation, M(10) is memory position 10 and R10 is register 10.

OP1	OP2	
ADD		

Memory

Pos	Content
0	60c2 <sub>hex</sub>
1	0010 <sub>hex</sub>
2	0008 <sub>hex</sub>
3	0001 <sub>hex</sub>
4	001a <sub>hex</sub>
5	F000 <sub>hex</sub>
6	5555 <sub>hex</sub>
7	bafe <sub>hex</sub>
8	1000 <sub>hex</sub>

Addressing	where	value <sub>hex</sub>
Direct to mem		
Indirect via mem		
Relative to PC (PC increases on fetching)		
Relative to base		

## Problem 6

Given the instruction formats in the table and the initial state of the memory. Derive the new state of the memory following the program instructions.

format	Address	op1	op2	op3
SUM1 op1,#op2,dest	Direct mem	immediate	Direct mem	
SUM2 #op1,#op2,(dest)	immediate	immediate	indirect	
SUM3 #op1,(op2),dest	immediate	indirect	Direct mem	

Program

SUM1 20, #30, 40  
SUM2 #20, #0, (60)  
SUM1 40, # -50, 100  
SUM3 #100, (100), 100

mem
:
20
40
:
40
60
:
60
100
:
100
:
100
-4
: