

COMP2240 – Computer Organization
Exercise Sheet (Lab #1)
(1 coursework mark)

Exercise #1: (7 points)

Complete the following truth tables for the logic gates. Please remember to order your inputs in the conventional manner (i.e. in counting order).

NOT	
In	Out
0	1
1	0

AND		
A	B	Out
0	0	0
0	1	0
1	0	0
1	1	1

OR		
A	B	Out
0	0	0
0	1	1
1	0	1
1	1	1

XOR		
A	B	Out
0	0	0
0	1	1
1	0	1
1	1	0

NAND		
A	B	Out
0	0	1
0	1	1
1	0	1
1	1	0

NOR		
A	B	Out
0	0	1
0	1	0
1	0	0
1	1	0

XNOR		
A	B	Out
0	0	1
0	1	0
1	0	0
1	1	1

Exercise #2: (4 points)

Complete the truth table for each of the combinational logic circuits given and write the Boolean function for the output of each circuit.

Circuit #1		
A	B	Out
0	0	0
0	1	1
1	0	1
1	1	1

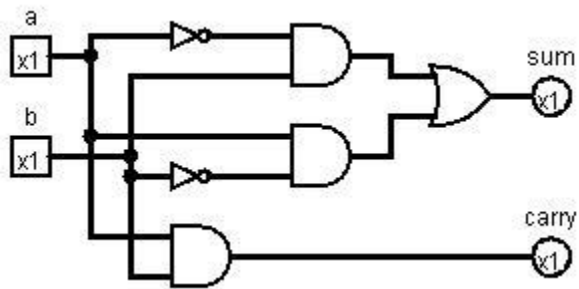
Circuit #2		
A	B	Out
0	0	
0	1	
1	0	
1	1	

Identify the
 Boolean function
 that this circuit
 implements

_____ OR GATE _____

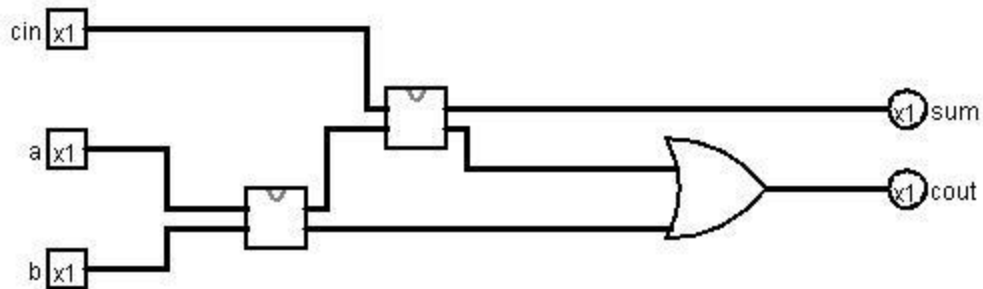
_____ OR GATE _____

Completion of half-adder: (6 marks)



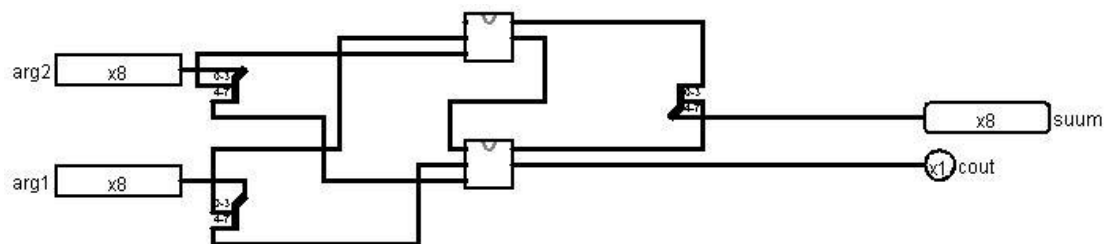
Exercise 3 (3 points)

Implementation of Full Adder



Exercise 4.1: (4 points)

Implement an 8-adder



Exercise 4.2 (10 points)

Using the 8-adder

Exercise 4.2.1 (7 points)

Use the 8-bit adder to perform the following arithmetic operations by setting the bits at the inputs. All binary numbers should be expressed/interpreted as 2's complement.

Operation to be carried out (Base 10)	Adder Inputs		ADDER OUTPUT	Adder output Convered to base 10
	A	B		
14 + 12	00001110	00001100	00011010	26
8 - 6	00001000	00000110	00000010	2
6 - 18	00000110	00010010	11110100	244
-120 - 95	01111000	00101111	11010111	215
8 - 8	00001000	00001000	00000000	0
76 + 68	01001100	01000100	10010000	144
120-92	01111000	01011100	00011100	28

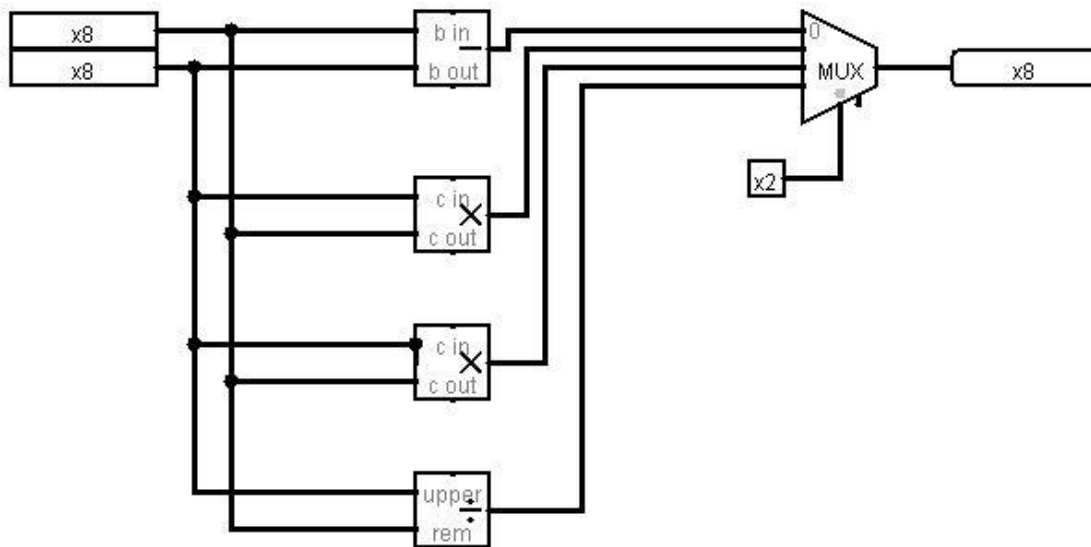
Observation: (4.2.2) (3 points)

There may have been at least one case in which the result that was produced by the adder was invalid. Identify the case(s) and explain briefly why this (these) situation(s) arose

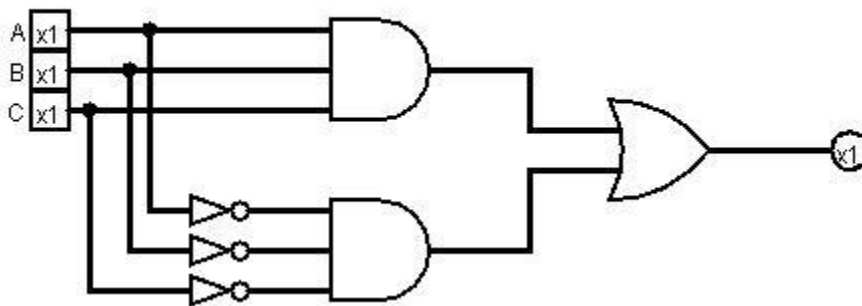
The fact is, the 8-adder is limited to addition so all the arithmetic calculations cannot be completed by the adder. The alu had to be used to do the the other calculations not involving addition, this is because it has the necessary properties to do so.

Exercise 4.3 (6 points)

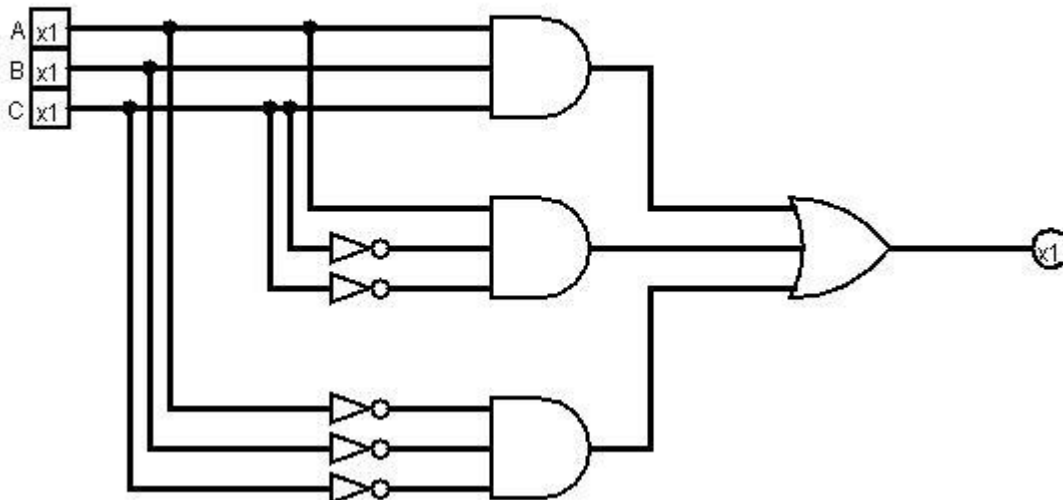
Implement an ALU

**Tutorials**

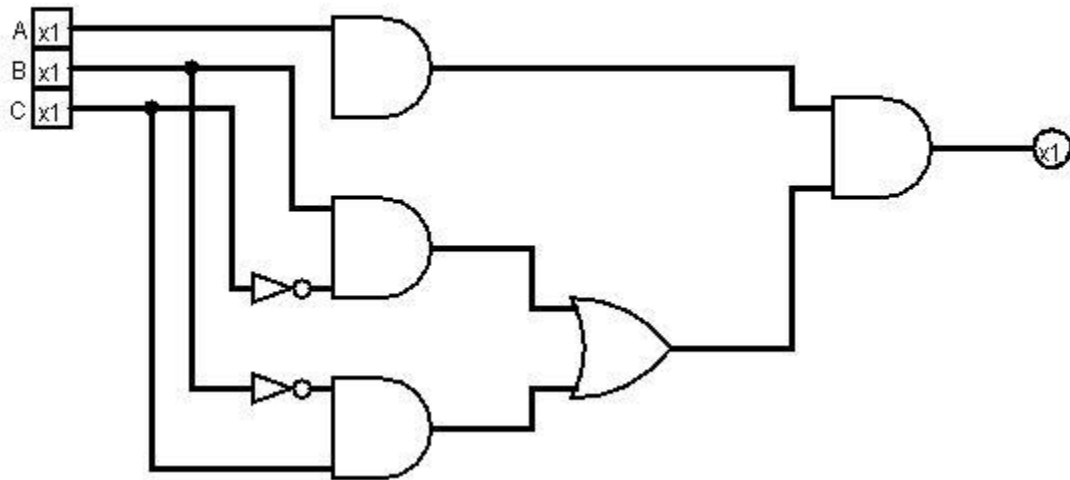
Question 1



Question 2



Question 3



Question 4

