Computer Science 240
Adders and ALU
Assignment for Lab 4

Submit a hardcopy with your answers at the beginning of lab

If you did the first 2 problems on last week's lab assignment, do not do them again (only turn in problem 3).
If you did NOT do last week's lab assignment, please complete all 3 problems.

1. Complete the truth table for two functions, **Sum** and **CarryOut**, which represent the result when adding two binary digits **A** and **B**:

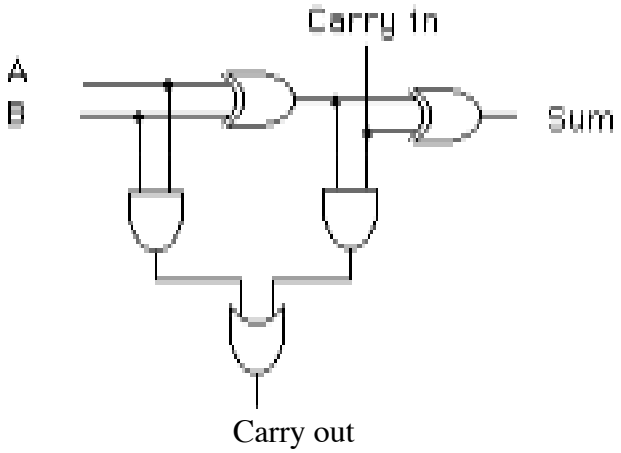
A	**B**	**CarryOut**	**Sum**
0	0		
0	1		
1	0		
1	1		

Draw a circuit which produces **Sum** and **CarryOut** from inputs **A** and **B** (this circuit is know as a *half adder*). You should use exactly one AND gate and one XOR (exclusive or) gate.

Give the truth table for a *full adder* (which incorporates a carry-in bit to the sum of **A** and **B**):

A	**B**	**CarryIn**	**CarryOut**	**Sum**
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

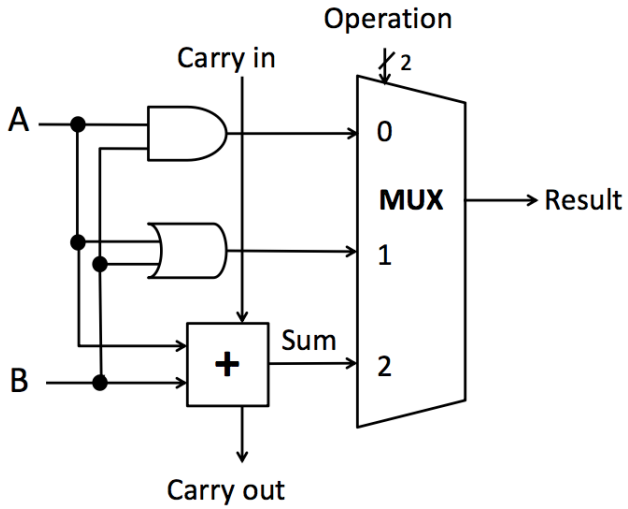
2. A circuit for the full adder is:



- Circle the two half adders.
- Explain what each half adder is doing, in relation to adding the three bits **A, B,** and **Carry in**:

- Explain what the OR gate is doing to produce the **Carry out**:

3. Give the truth table for the following circuit (the box with **+** is a 1-bit adder):



assume **Operation** is a 2-bit value **Op1 Op0**

Op1	**Op0**	**Result** (express in terms of **A** and **B**)
0	0	
0	1	
1	0	
1	1	

Describe the general purpose of this circuit: