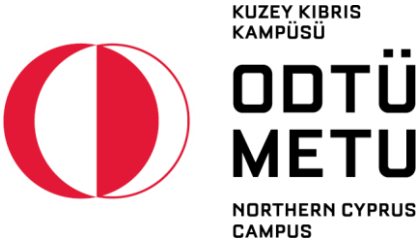

TERM PROJECT
#1 REPORT

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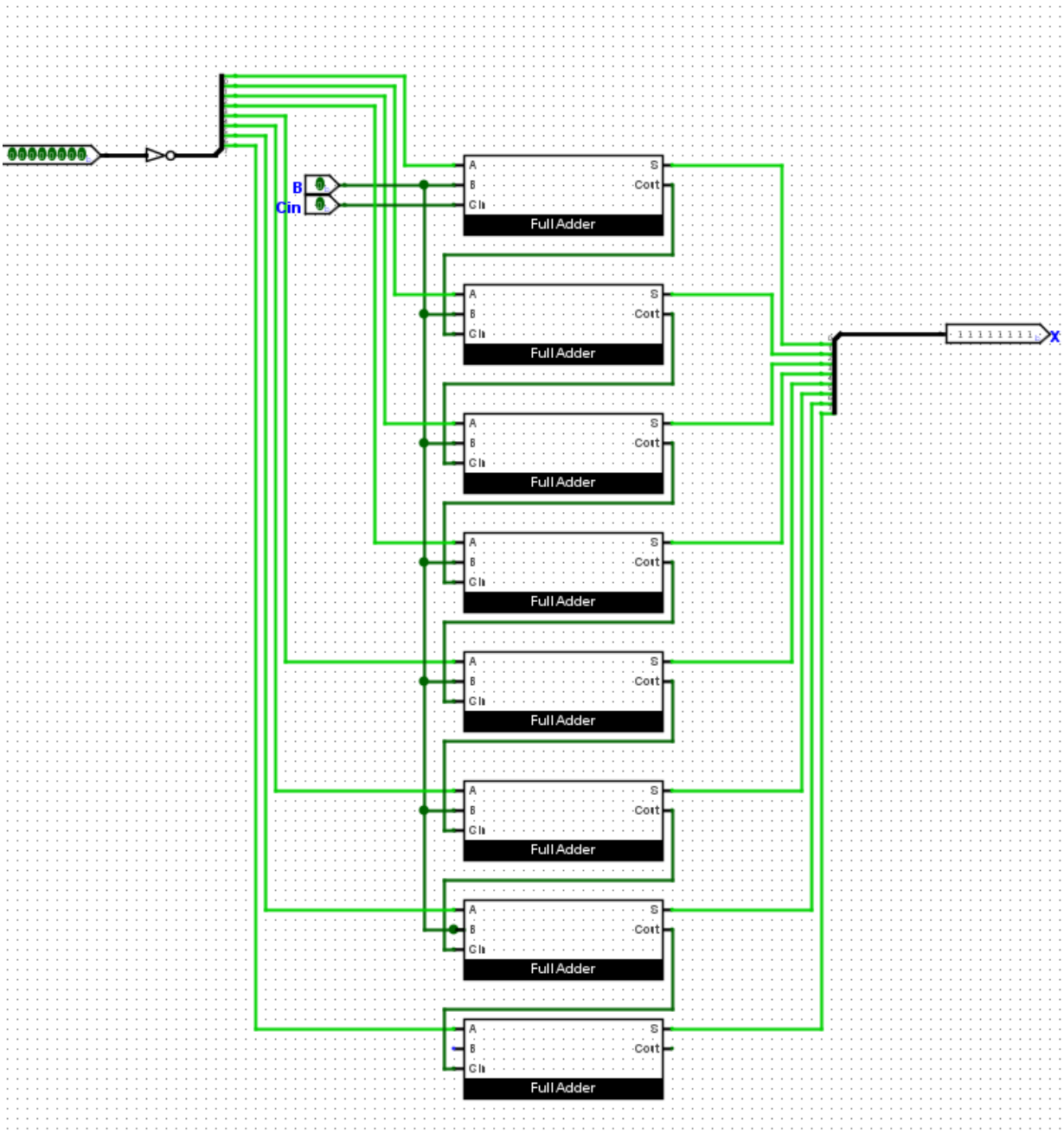
Question: 1

Take a screenshot of your schematic (circuit you build through steps 1-10) and add it to your report with an explanation and a test value (using poke tool)



A 2's complement circuit consisting of 8 FullAdders. With Cin being 0 the circuit is just the same as a 1's complement circuit, but when Cin is 1, the circuit becomes 2's complement since 2's complement = 1's complement+1.

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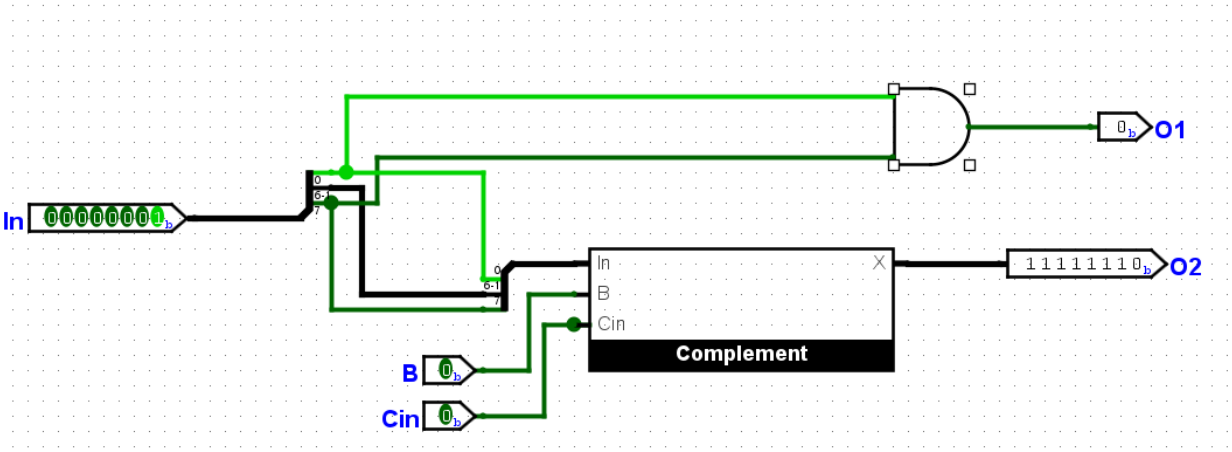


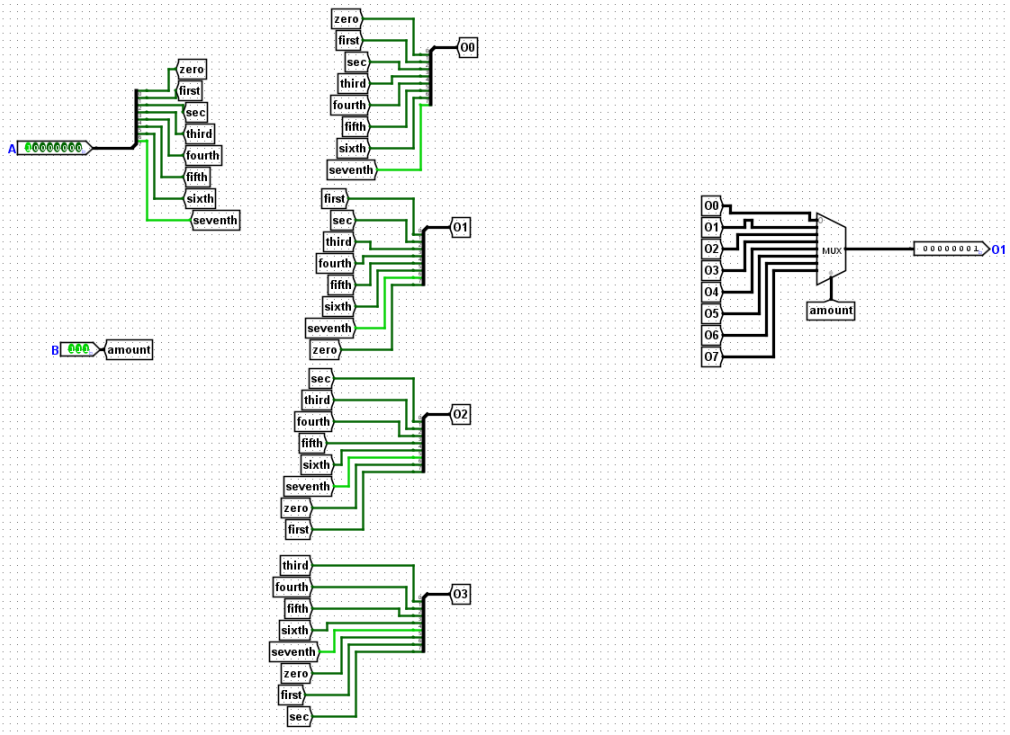
Here, the input value is splitted into three and then merged into one again to get 2's complement which is connected to O2 output, while the inputs were splitted, the 0^{th} and 7^{th} bits are sent to and and gate which is connected to O1 output.

Question: 2

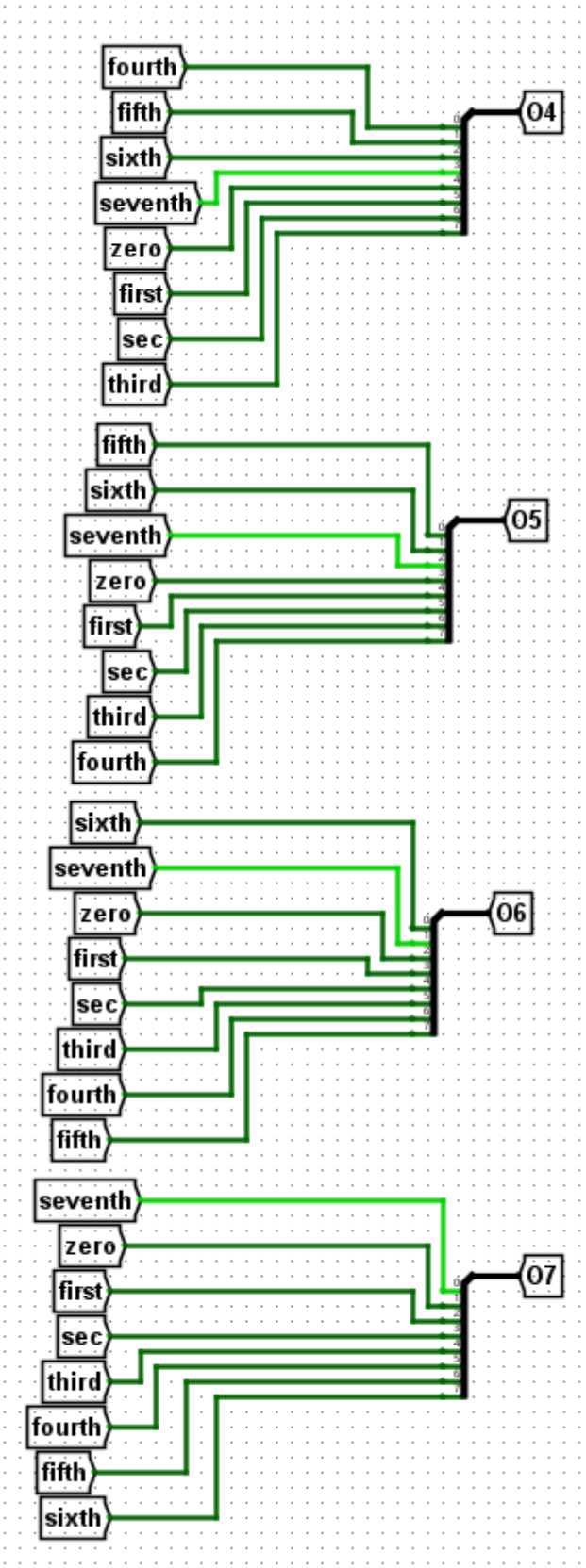
Implement two subcircuits, one to rotate right an 8-bit input value and a second to rotate an 8-bit input value left. Hint: you will need two inputs for each subcircuit, one is the input to be rotated, and the second input will hold the rotation amount. Call the first input A and the second Input B. What is the size of input B? And why? Answer this question and add screenshots of your subcircuits with an explanation to your report

Input A is 8 bits, and to rotate all the bits on the input we are going to need an amount that is equal to 7. So input B has the size of 3 bits.

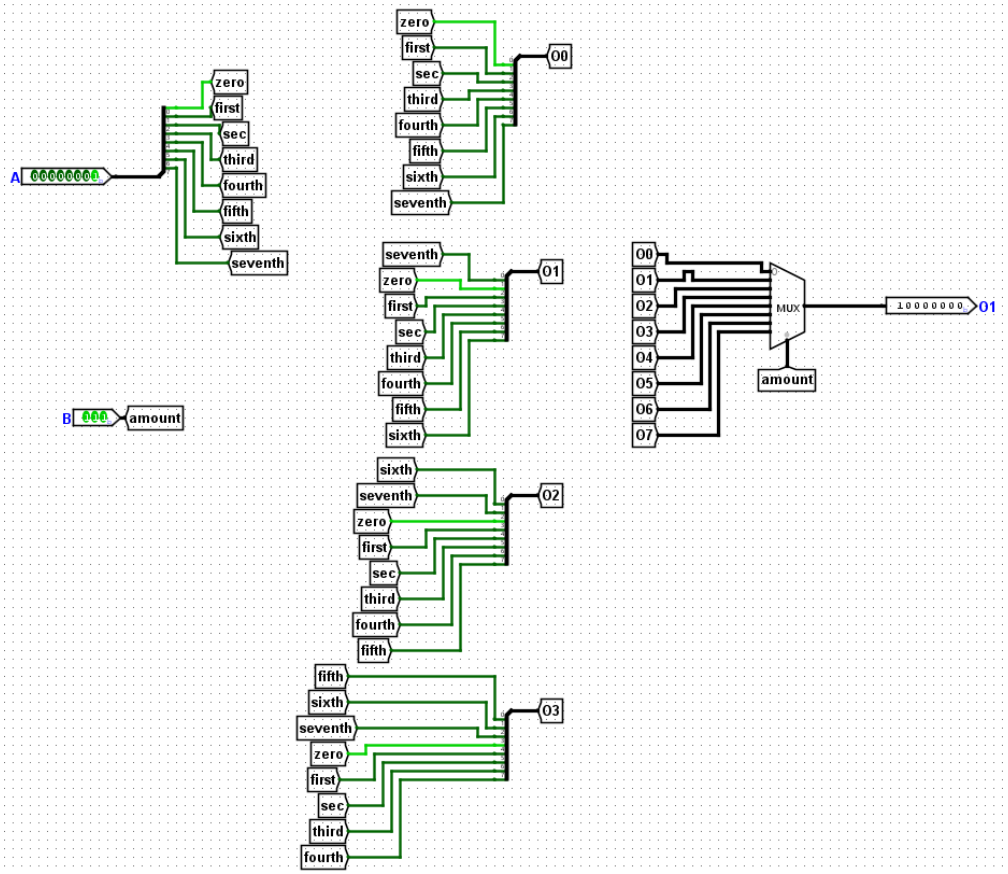
Rotr Circuit: 1^{st} screenshot



Rotr Circuit: 2nd screenshot



Rotl Circuit: 1st screenshot

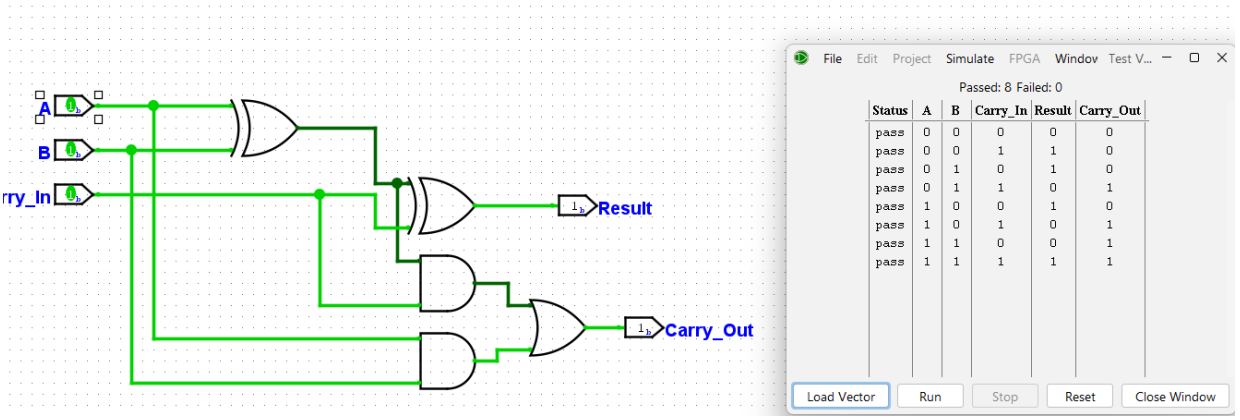


Rotl Circuit: 2nd screenshot

Question: 3

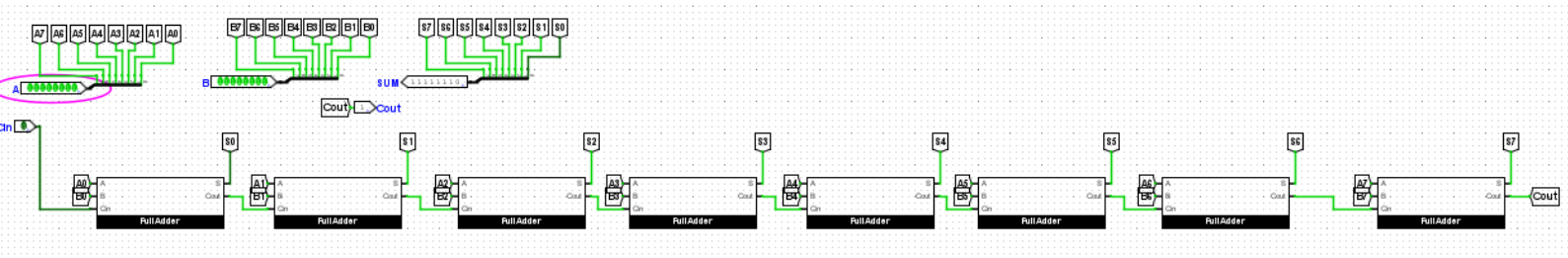
Build an 8-bit full adder using the same method explained in the tutorial examples. Add a screenshot of your schematic and test results (USING A TEST VECTOR YOU WILL WRITE). Attach the circuit and test file to odtuclass.

A 1 bit Full Adder tested with a test vector:

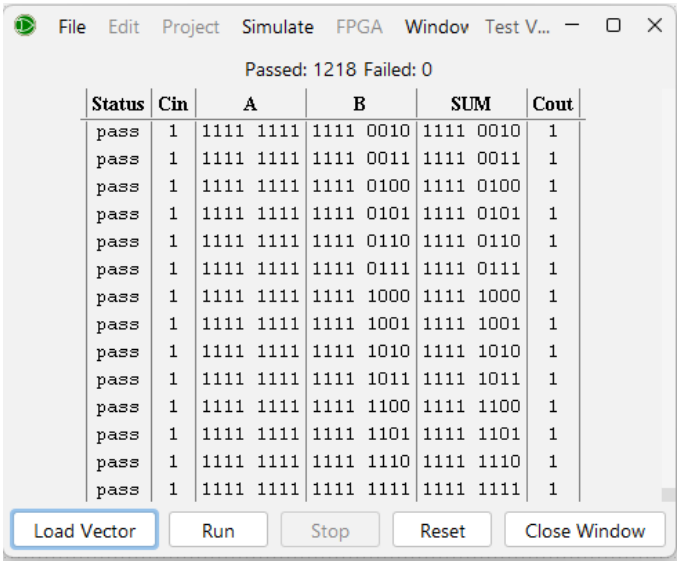


Status	A	B	Carry_In	Result	Carry_Out
pass	0	0	0	0	0
pass	0	0	1	1	0
pass	0	1	0	1	0
pass	0	1	1	0	1
pass	1	0	0	1	0
pass	1	0	1	0	1
pass	1	1	0	0	1
pass	1	1	1	1	1

An 8 bit Full Adder:



Test vector results of the 8 bit Full Adder:

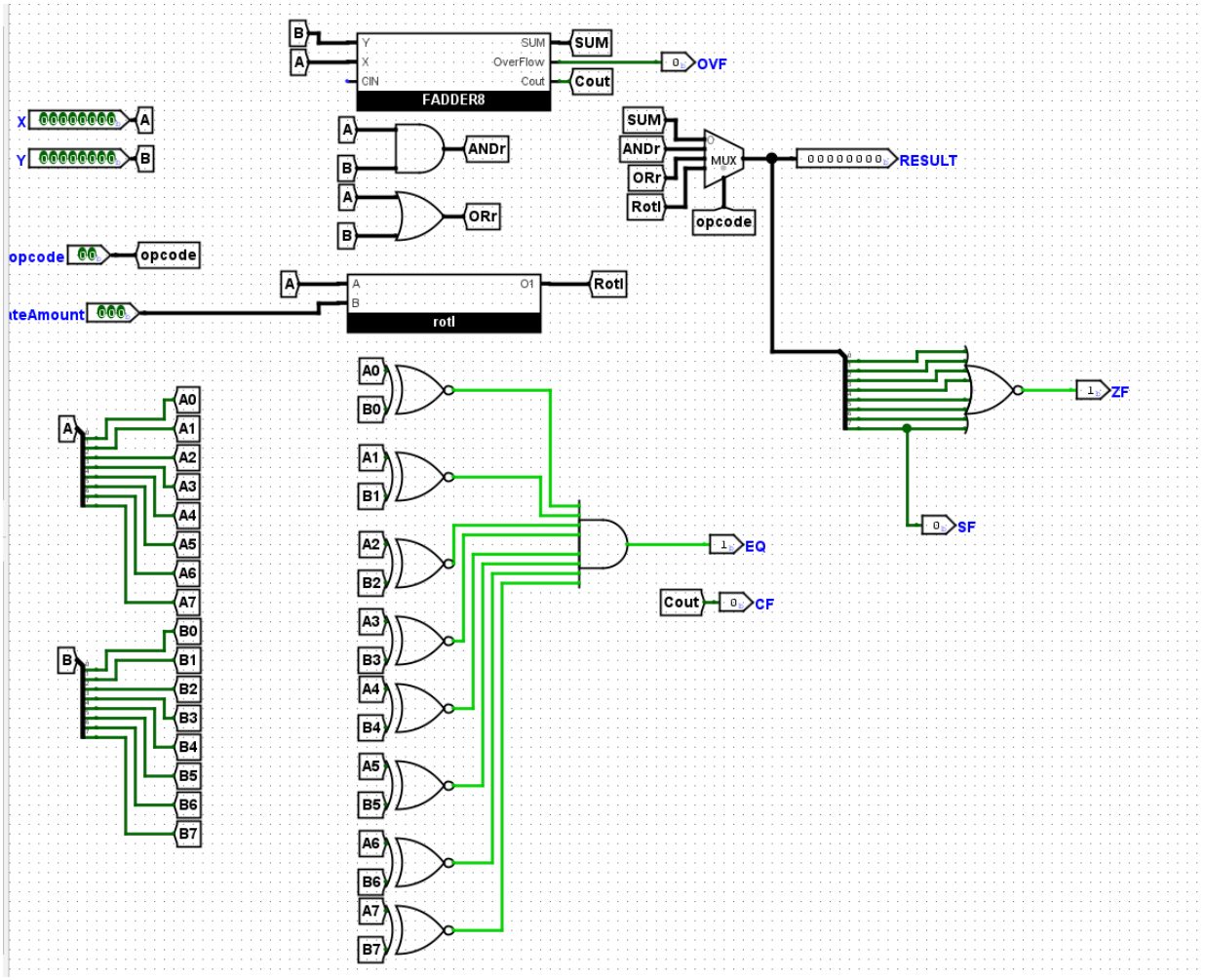


Status	Cin	A	B	SUM	Cout
pass	1	1111 1111	1111 0010	1111 0010	1
pass	1	1111 1111	1111 0011	1111 0011	1
pass	1	1111 1111	1111 0100	1111 0100	1
pass	1	1111 1111	1111 0101	1111 0101	1
pass	1	1111 1111	1111 0110	1111 0110	1
pass	1	1111 1111	1111 0111	1111 0111	1
pass	1	1111 1111	1111 1000	1111 1000	1
pass	1	1111 1111	1111 1001	1111 1001	1
pass	1	1111 1111	1111 1010	1111 1010	1
pass	1	1111 1111	1111 1011	1111 1011	1
pass	1	1111 1111	1111 1100	1111 1100	1
pass	1	1111 1111	1111 1101	1111 1101	1
pass	1	1111 1111	1111 1110	1111 1110	1
pass	1	1111 1111	1111 1111	1111 1111	1

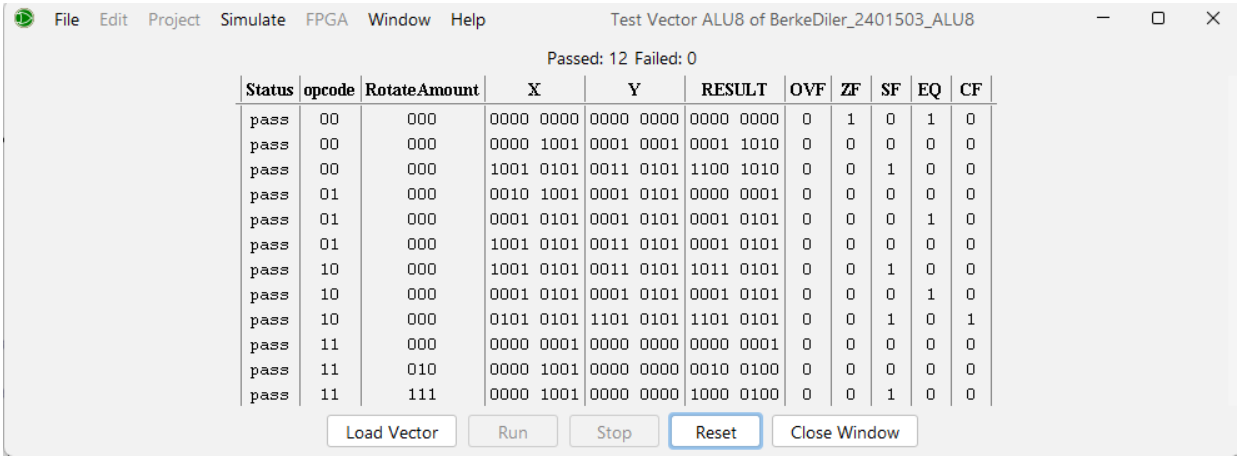
Question: 4

Draw a circuit layout, build it using Logisim, and write a test to test all the functions. You need to add the layout along with the test results (USING A TEST VECTOR YOU WILL WRITE) to your report. In addition to that, you need to upload the .circ file along with the ALU8_test.txt to ODTUClass.

8-bit ALU Design:



8-bit ALU Test Vector Results:



Status	opcode	RotateAmount	X	Y	RESULT	OVF	ZF	SF	EQ	CF
pass	00	000	0000 0000	0000 0000	0000 0000	0	1	0	1	0
pass	00	000	0000 1001	0001 0001	0001 1010	0	0	0	0	0
pass	00	000	1001 0101	0011 0101	1100 1010	0	0	1	0	0
pass	01	000	0010 1001	0001 0101	0000 0001	0	0	0	0	0
pass	01	000	0001 0101	0001 0101	0001 0101	0	0	0	1	0
pass	01	000	1001 0101	0011 0101	0001 0101	0	0	0	0	0
pass	10	000	1001 0101	0011 0101	1011 0101	0	0	1	0	0
pass	10	000	0001 0101	0001 0101	0001 0101	0	0	0	1	0
pass	10	000	0101 0101	1101 0101	1101 0101	0	0	1	0	1
pass	11	000	0000 0001	0000 0000	0000 0001	0	0	0	0	0
pass	11	010	0000 1001	0000 0000	0010 0100	0	0	0	0	0
pass	11	111	0000 1001	0000 0000	1000 0100	0	0	1	0	0