Lab 3. Splitters, Adders and ALUs.

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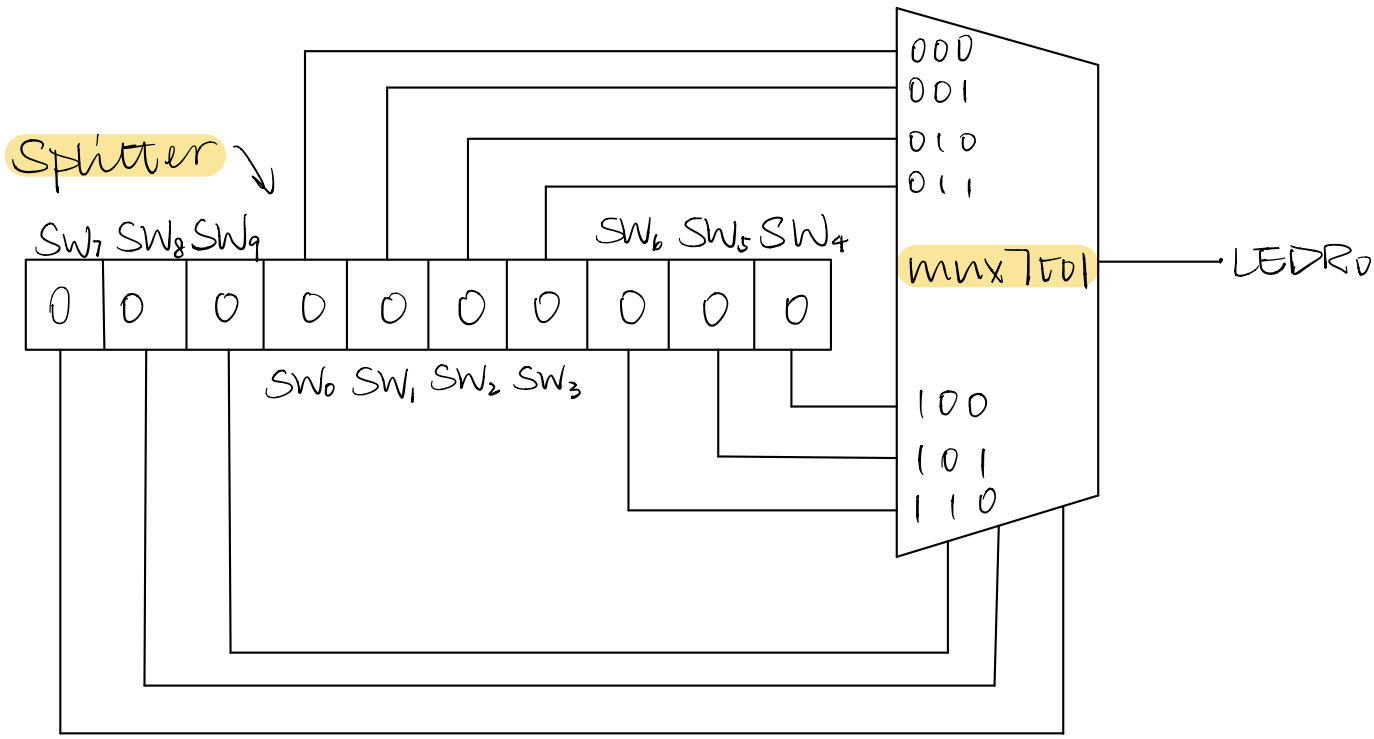
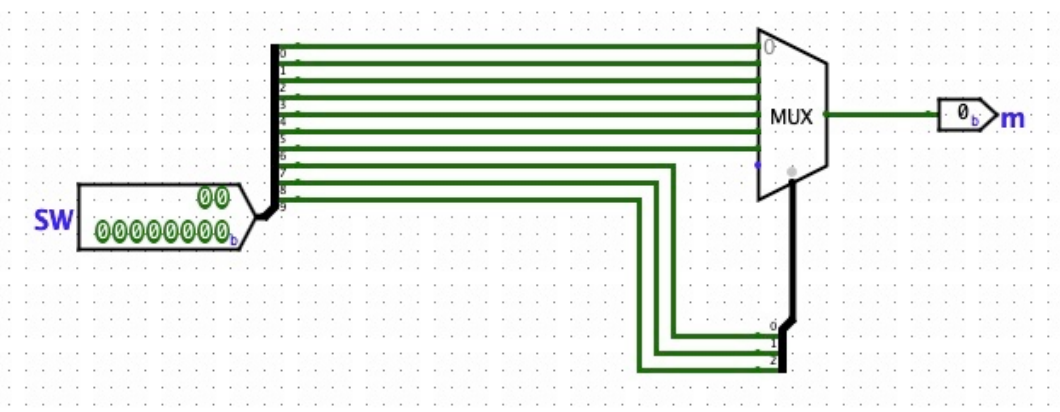
Part 1:

1. The schematic below is for the 7-to-1 multiplexer:

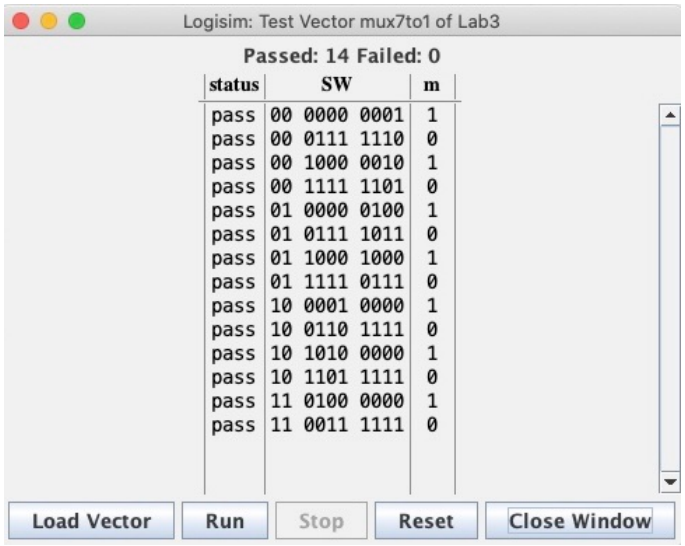


(b). We need 10 multi-bit input to be provide all the inputs to the 7-to-1 multiplexer.

2. Logisim design for Question1:



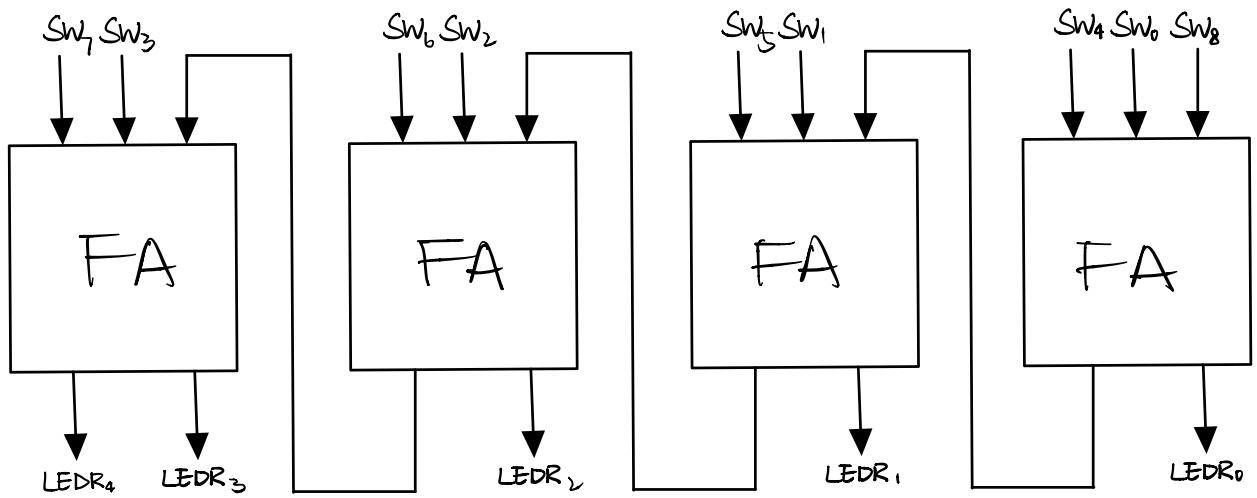
3. Here's the test result:



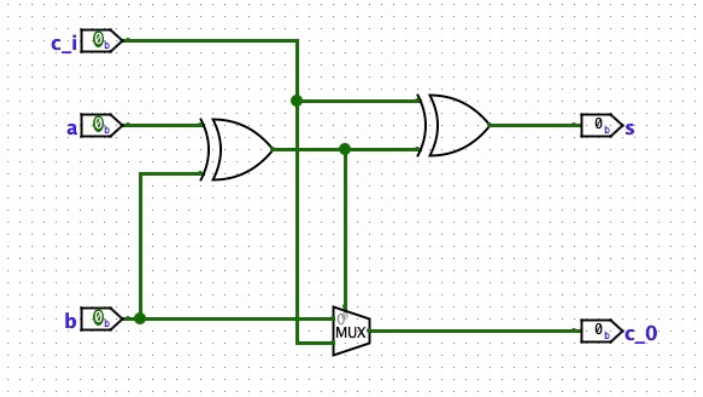
In this test, the columns are matching the inputs from SW9 to SW0.
And m is the output.

Part 2:

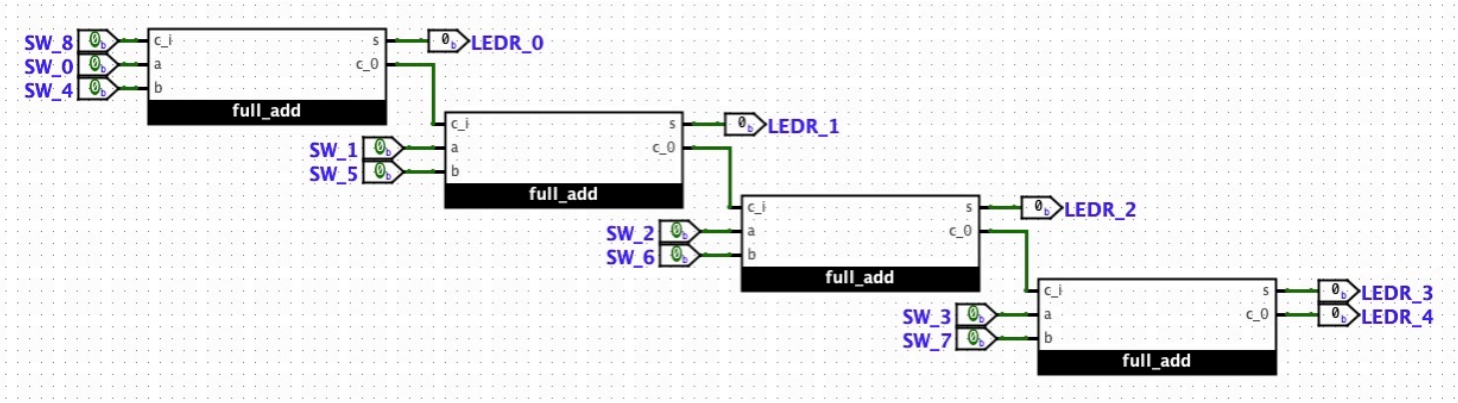
1.



2. Below are the two circuits built in Logisim:



Circuit for the full adder.



Circuit for the 4-bit ripple-carry

3. Test of some cases:

Logisim: Test Vector ripple_carry of Lab3

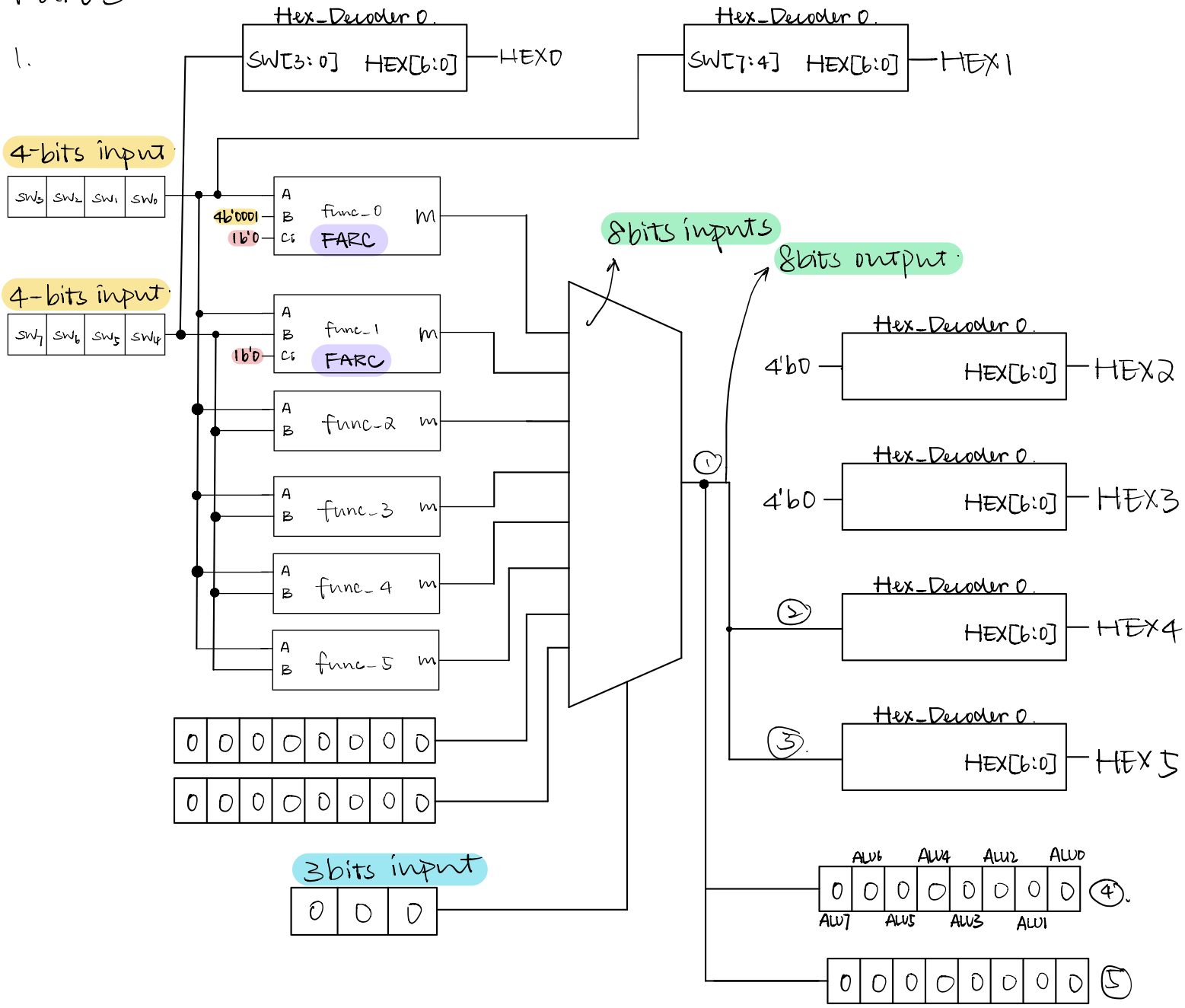
Passed: 14 Failed: 0

status	SW_8	SW_0	SW_4	SW_1	SW_5	SW_2	SW_6	SW_3	SW_7	LEI
pass	0	0	0	0	0	0	0	0	0	
pass	1	0	0	0	0	0	0	0	0	
pass	0	1	0	0	0	0	0	0	0	
pass	0	0	1	0	0	0	0	0	0	
pass	0	1	1	0	0	0	0	0	0	
pass	0	0	0	0	1	0	0	0	0	
pass	0	0	0	1	1	0	0	0	0	
pass	0	0	0	1	1	0	1	0	0	
pass	0	0	0	0	0	0	1	0	0	
pass	0	0	0	0	0	1	1	1	0	
pass	0	0	0	0	0	0	1	1	0	
pass	0	0	0	0	0	0	0	1	0	
pass	0	0	0	0	0	0	0	1	1	
pass	0	0	0	0	0	0	0	0	1	

Load Vector | Run | Stop | Reset | Close Window

Part 3:

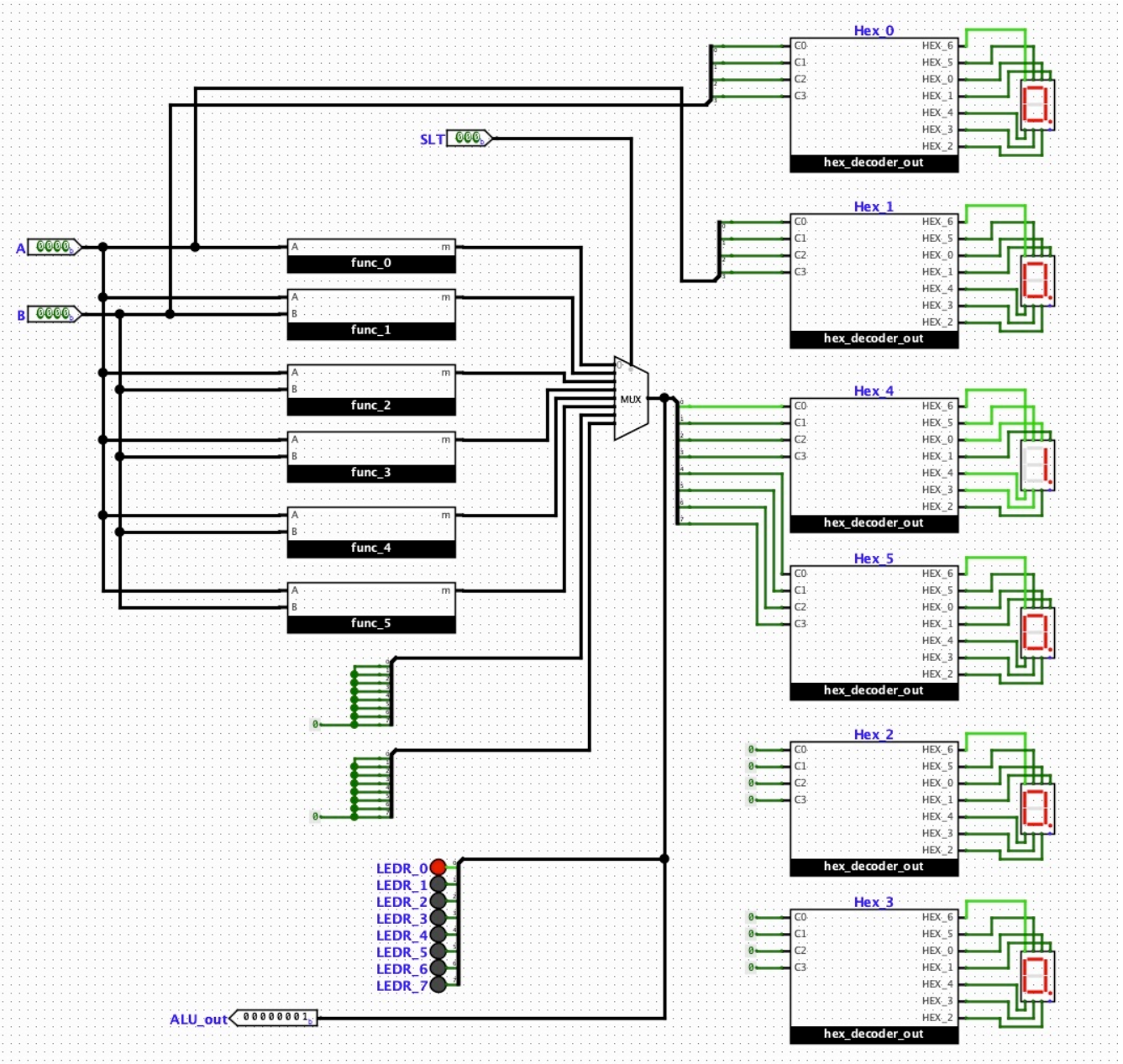
1.



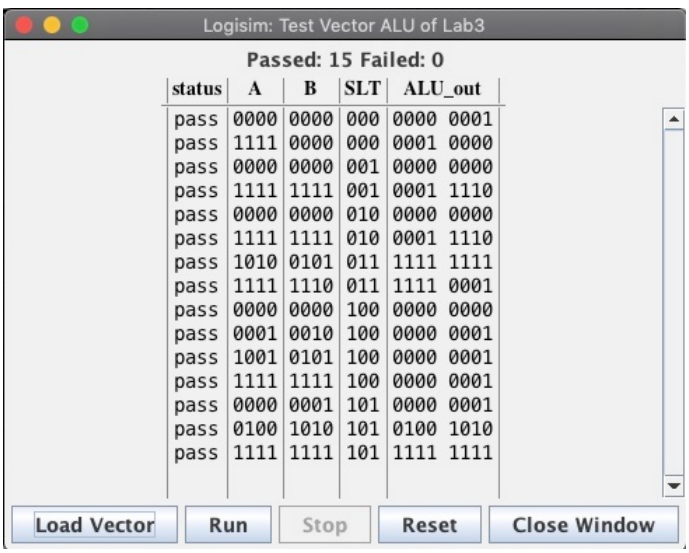
* Note:

- SLT: select bits.
- ①: ALU out
- ②: ALU out [3:0]
- ③: ALU out [7:4]
- A matches to SW[3:0]
- B matches to SW[7:4].
- ④ LEDR[7:0]
- ⑤. ALU_out : ALU output.
- HEX0: displaying B.
- HEX1: displaying A
- HEX2: displaying 0
- HEX3: displaying 0
- HEX4: displaying ALU[3:0]
- HEX5: displaying ALU[7:4]
- FARC: full adder ripple carry.

2. Here are the circuit of ALU:



3. Here are the tests I made to test my ALU:



status	A	B	SLT	ALU_out
pass	0000	0000	000	0000 0001
pass	1111	0000	000	0001 0000
pass	0000	0000	001	0000 0000
pass	1111	1111	001	0001 1110
pass	0000	0000	010	0000 0000
pass	1111	1111	010	0001 1110
pass	1010	0101	011	1111 1111
pass	1111	1110	011	1111 0001
pass	0000	0000	100	0000 0000
pass	0001	0010	100	0000 0001
pass	1001	0101	100	0000 0001
pass	1111	1111	100	0000 0001
pass	0000	0001	101	0000 0001
pass	0100	1010	101	0100 1010
pass	1111	1111	101	1111 1111