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Class Group: __COMP1DX__

Lab 7 – Decoders and Multiplexers

1.   Complete the following truth table for a binary decoder:

Truth Table:

A_1	A_0	D_0	D_1	D_2	D_3	Product of Terms
0	0	1	0	0	0	$D_0 = A_1{}'A_0{}'$
0	1	0	1	0	0	$D_1 = A_1{}'A_0$
1	0	0	0	1	0	$D_2 = A_1 A_0{}'$
1	1	0	0	0	1	$D_3 = A_1 A_0$

2.   Design a circuit which implements the binary decoder outlined in the truth table above. Verify its operation using the simulator and paste a snapshot of your circuit below.

Circuit:
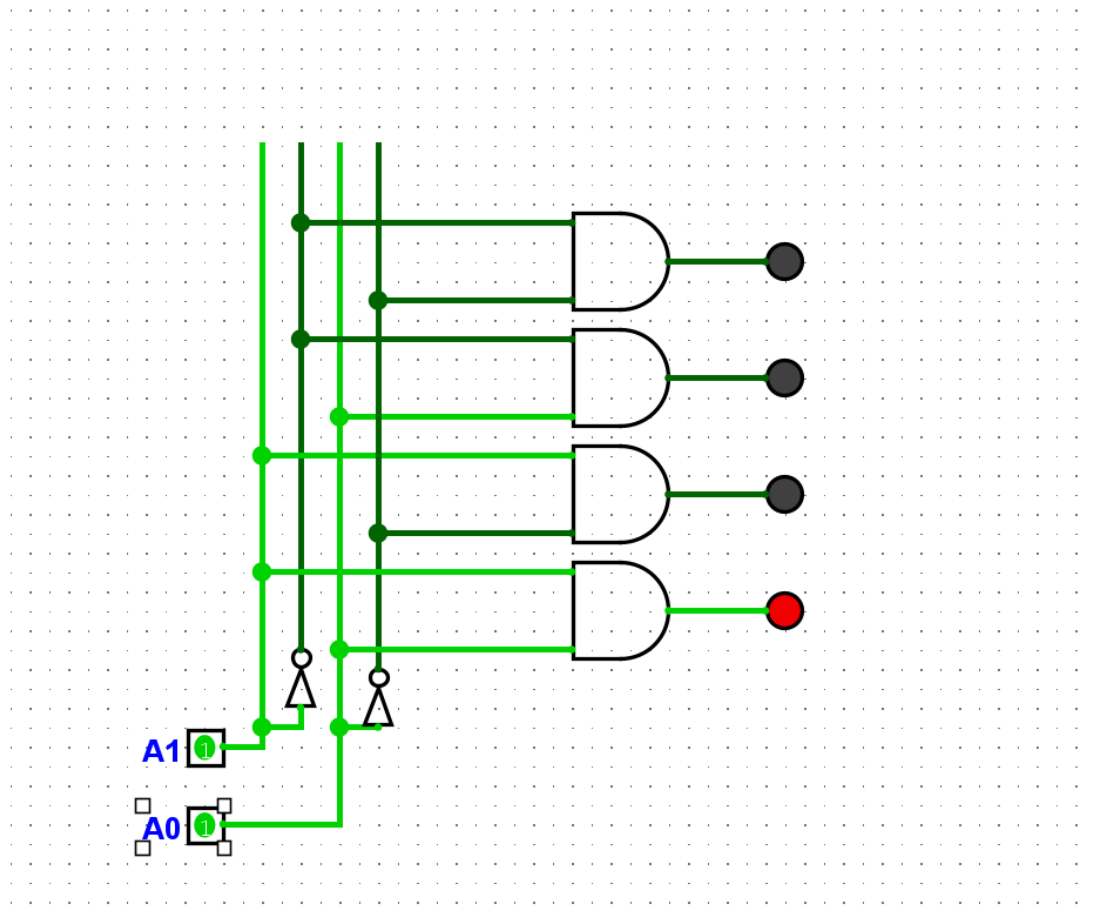
3.   Draw the black box representation and complete the truth table for a 3-to-8 binary decoder:
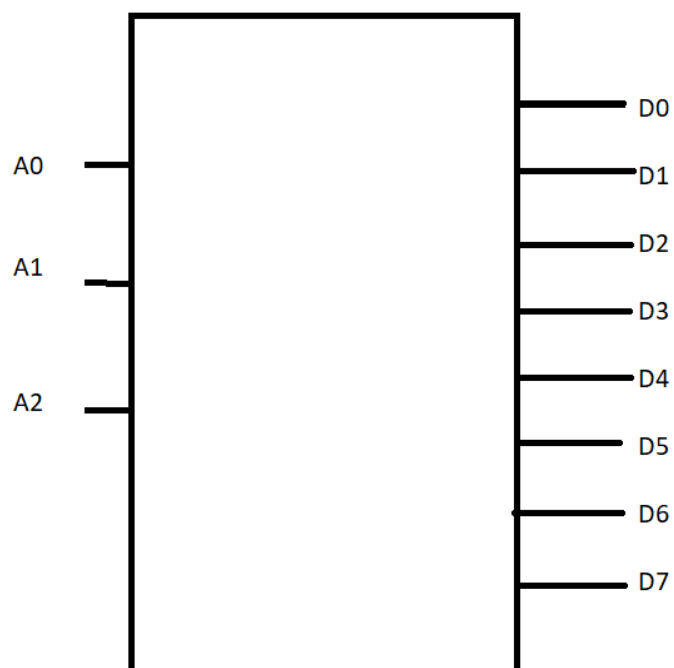
A0	A1	A2	D0	D1	D2	D3	D4	D5	D6	D7
0	0	0	1	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0	0	0	0
0	1	0	0	0	1	0	0	0	0	0
0	1	1	0	0	0	1	0	0	0	0
1	0	0	0	0	0	0	1	0	0	0
1	0	1	0	0	0	0	0	1	0	0
1	1	0	0	0	0	0	0	0	1	0
1	1	1	0	0	0	0	0	0	0	1

4.   Design a circuit which implements the 3-to-8 binary decoder outlined in the truth table from Q.3. Verify its operation using the simulator and paste a snapshot of your circuit below.

Circuit:

$D_0 = A_0'A_1'A_2'$ $D1 = A_0'A_1'A_2$ $D2 = A_0'A_1A_2'$ $D3 = A_0'A_1A_2$

$D4 = A_0A_1'A_2'$ $D5 = A_0A_1'A_2$ $D6 = A_0A_1A_2'$ $D7 = A_0A_1A_2$
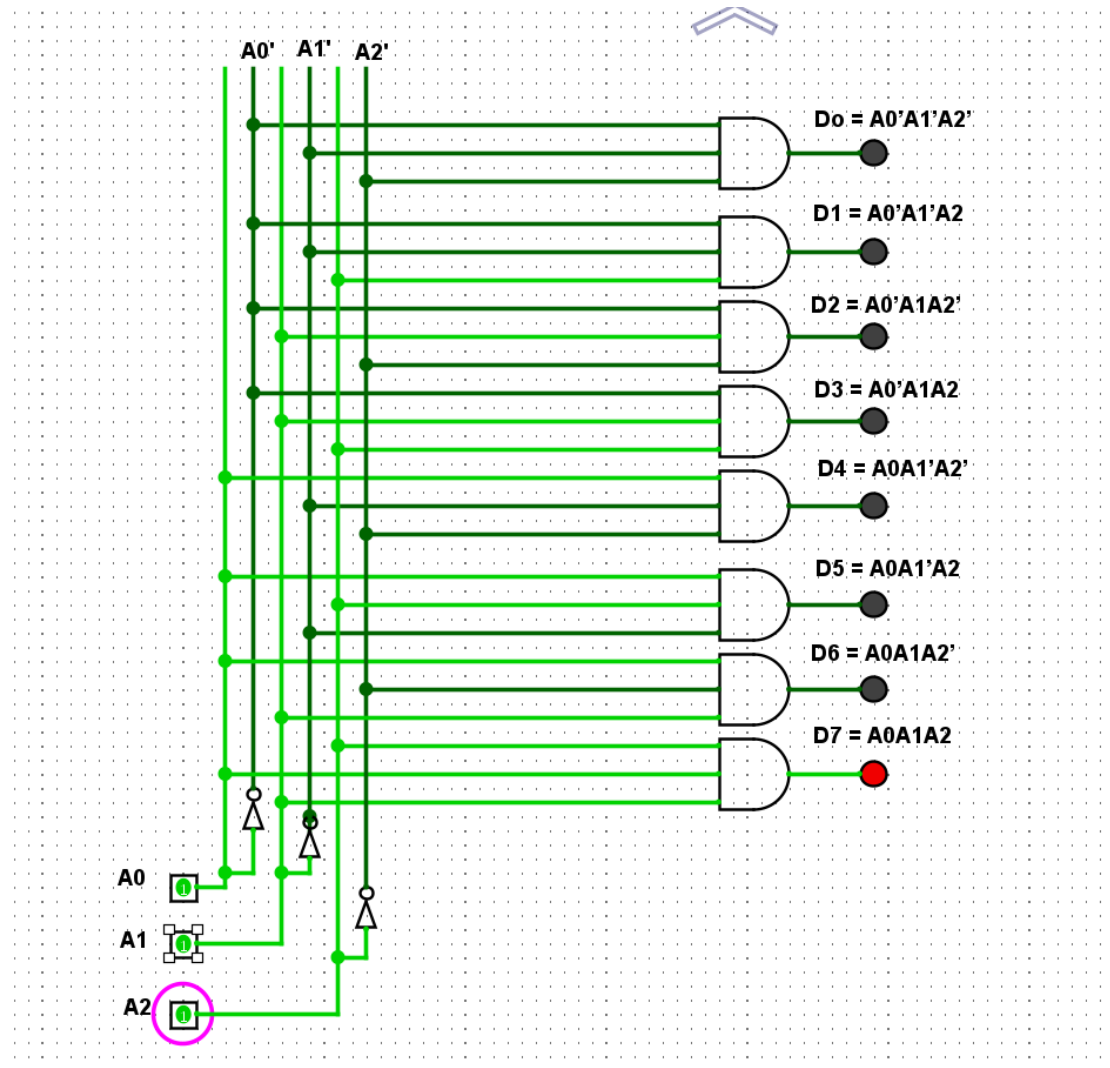
5.   Complete the following truth table for a multiplexer.

Truth Table:

S$_1$	S$_0$	I$_0$	I$_1$	I$_2$	I$_3$	Output	Product of Terms
0	0	0	x	x	x	M0	
0	1	x	0	x	x	M1	
1	0	x	x	0	x	M2	
1	1	x	x	x	0	M3	
0	0	1	x	x	x	M4	*S1'S2' I0*
0	1	x	1	x	x	M5	*S1'S2 I0*
1	0	x	x	1	x	M6	*S1S2' I0*
1	1	x	x	x	1	M7	*S1S2 I0*

6.   Design a circuit which implements the multiplexer outlined in the truth table above. Verify its operation using the simulator and paste a snapshot of your circuit below.

Circuit: