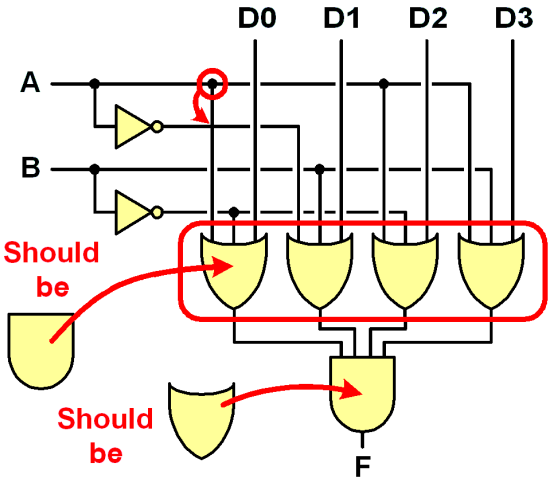
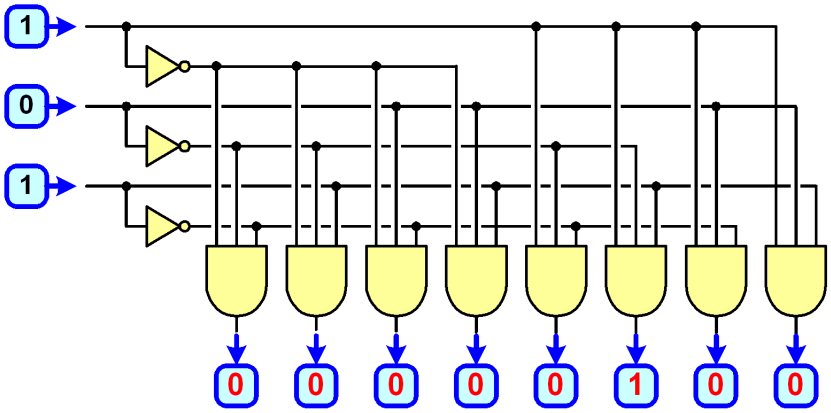
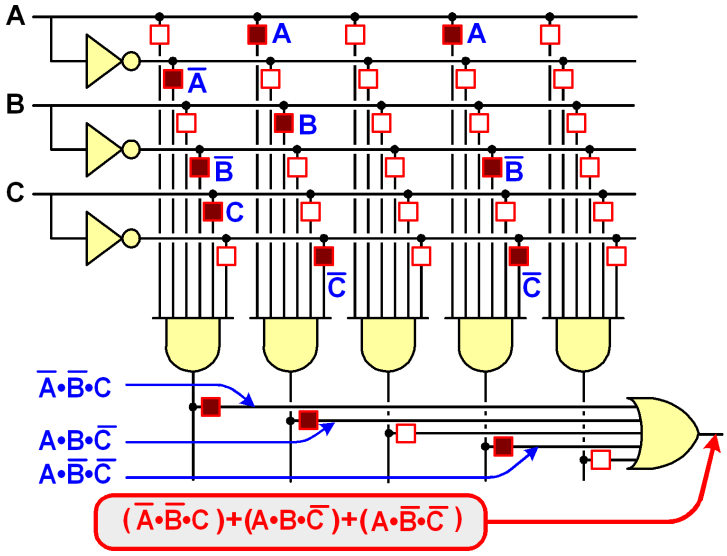
1. **Identify the errors** in the following multiplexer circuit:



2. **Show the outputs** of the following decoder circuit based on the given inputs:



3. **Write a Boolean expression** that shows what is being done by the following Programmable Logic Array circuit (filled-in boxes represent connected fuses).



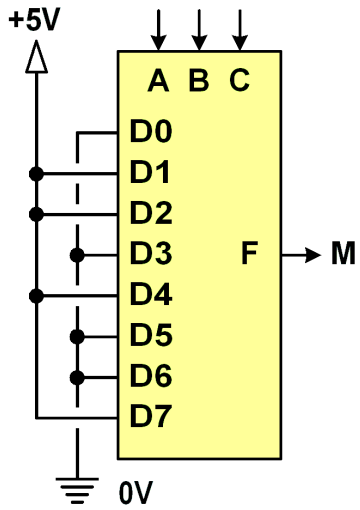
4. **What happens** to the value of a binary number when it's put through a shifter circuit that moves all the bits one position to the **right**?

   The value is divided by 2

5. Use a **multiplexer** to create a circuit that produces an **even parity output** for **three input bits**. In other words, the output should be **TRUE** if the number of **TRUE** inputs is **odd**.

A	B	C	Result
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Total # of "1" bits is even



6. **Fill in** the following truth table for a **full adder**:

A	B	Carry In	Sum	Carry Out
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

7. An 8-bit ALU has the following numbers present on it's A and B inputs:

A_7	A_6	A_5	A_4	A_3	A_2	A_1	A_0
0	1	0	0	1	0	1	1

B_7	B_6	B_5	B_4	B_3	B_2	B_1	B_0
0	0	1	1	0	1	0	1

Show what the ALU outputs will be given the following control inputs:

F0	F1	ENA	ENB	INVA	INC	O_7	O_6	O_5	O_4	O_3	O_2	O_1	O_0
0	0	1	1	0	0	0	0	0	0	0	0	0	1
1	1	1	1	0	0	1	0	0	0	0	0	0	0
1	0	1	0	1	1	1	1	1	1	1	1	1	1

8. **Convert** the following decimal numbers to **8-bit signed binary numbers**:

87 = 64 + 16 + 4 + 2 + 1

128	64	32	16	8	4	2	1
0	1	0	1	0	1	1	1

-92

+92 = 64 + 16 + 8 + 4

128	64	32	16	8	4	2	1
0	1	0	1	1	1	0	0

flip bits

1	0	1	0	0	0	1	1

add 1

-92 =

1	0	1	0	0	1	0	0

9. **Convert** the following **8-bit signed binary numbers** to decimal:

10110101 negative

1	0	1	1	0	1	0	1

flip bits

0	1	0	0	1	0	1	0

add 1

0	1	0	0	1	0	1	1
128	64	32	16	8	4	2	1

64 + 8 + 2 + 1 = 75
so original number is -75

01011011 positive

128	64	32	16	8	4	2	1
0	1	0	1	1	0	1	1

64 + 16 + 8 + 2 + 1 = 91