

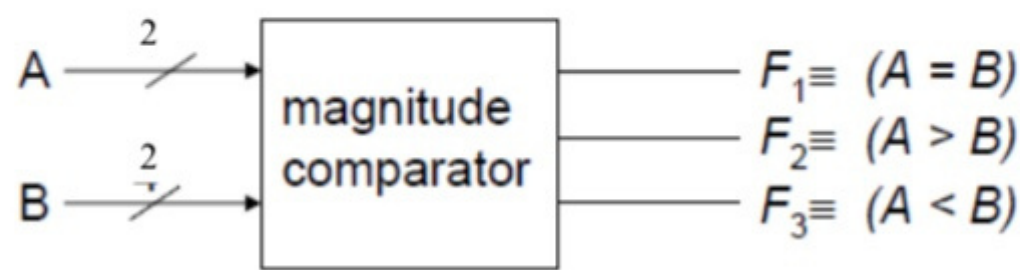
The background of the entire page is a dark purple gradient. It features a faint, glowing silhouette of a person standing with arms slightly out, centered in the upper half. Surrounding this silhouette are various vertical columns of binary code (0s and 1s) in a light purple, monospace font. Some columns are more prominent than others, creating a digital, data-driven atmosphere.

DIGITAL LOGIC DESIGN HOMEWORK

Design the following circuits using Logisim Software:

1. 2-bit Magnitude Comparator Circuit:

Magnitude Comparator is a combinational circuit that compares 2 bits. It generates three outputs F1, F2, and F3.



Truth TAbLe of 2-Bit Magnitude comparator

INPUT				OUTPUT		
A1	A0	B1	B0	A<B	A=B	A>B
0	0	0	0	0	1	0
0	0	0	1	0	0	1
0	0	1	0	0	0	1
0	0	1	1	0	0	1
0	1	0	0	1	0	0
0	1	0	1	0	1	0
0	1	1	0	0	0	1
0	1	1	1	0	0	1
1	0	0	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	0	1	0
1	0	1	1	0	0	1
1	1	0	0	1	0	0
1	1	0	1	1	0	0
1	1	1	0	1	0	0
1	1	1	1	0	1	0

iii. Simplify the function using (K-Map)

A<B

		B1B0			
		00	01	11	10
A1A0	00	0	1	1	1
	01	0	0	1	1
	11	0	0	0	0
	10	0	0	1	0

=A1'B1+A1'A0'B0+A0'B1B0

A>B

		B1B0			
		00	01	11	10
A1A0	00	0	0	0	0
	01	1	0	0	0
	11	1	1	0	1
	10	1	1	0	0

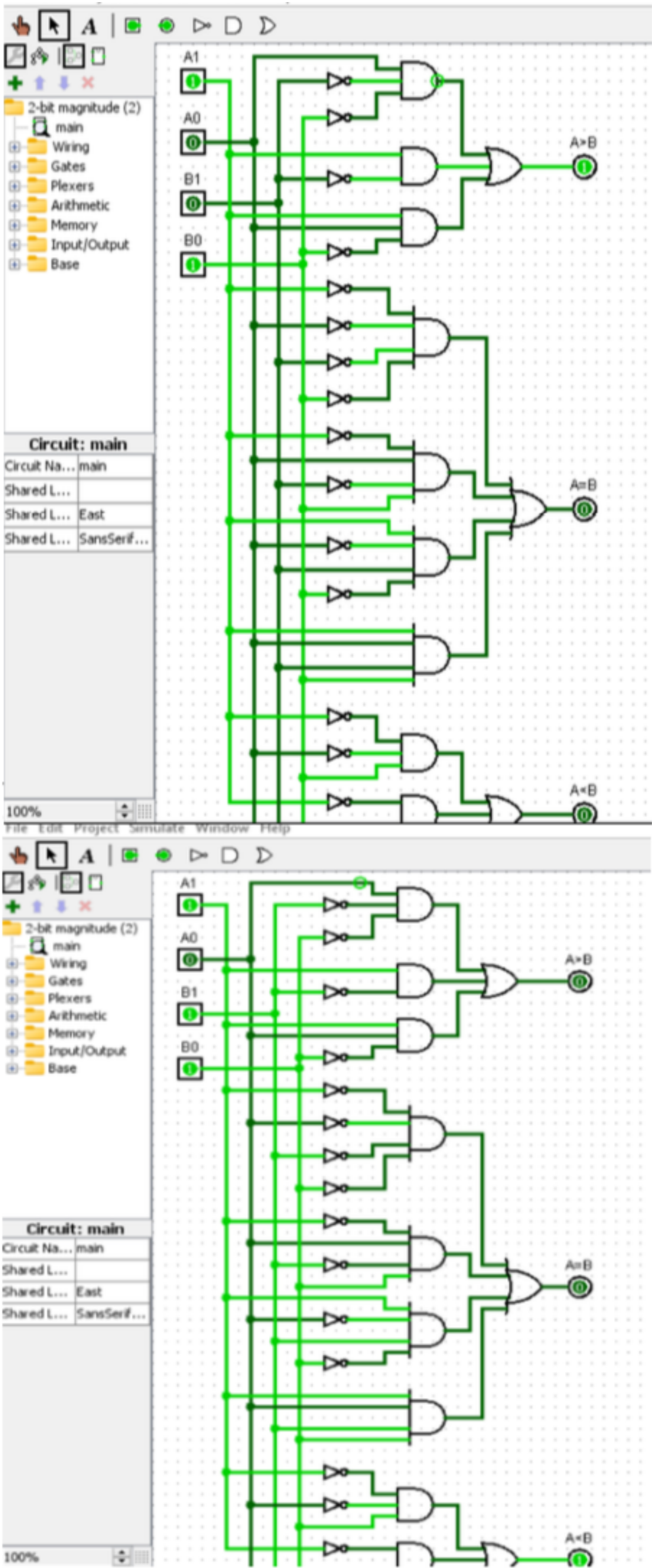
=A1B1'+A0B1'B0'+A1A0B0'

A=B

		B1B0			
		00	01	11	10
1A0	00	1	0	0	0
	01	0	1	0	0
	11	0	0	1	0
	10	0	0	0	1

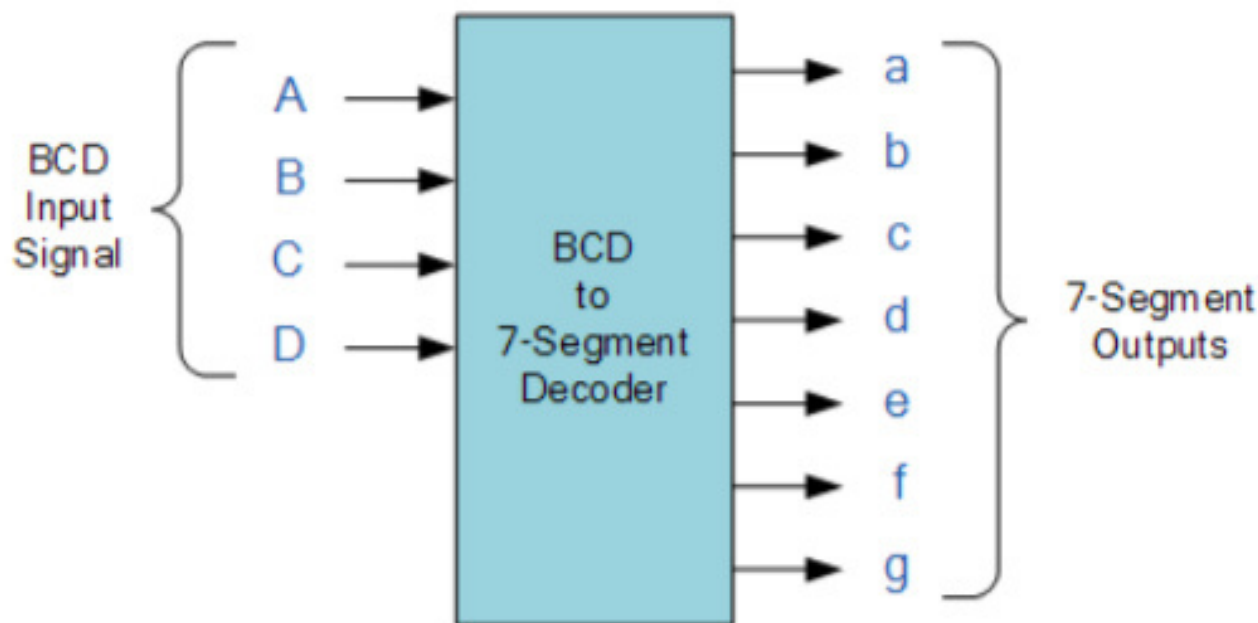
=A1'A0'B1'B0'+A1'A0B1'B0+A1A0B1B0+A1A0'B1B0'

Draw logic gates



2. BCD to 7-Segment Decoder Circuit:

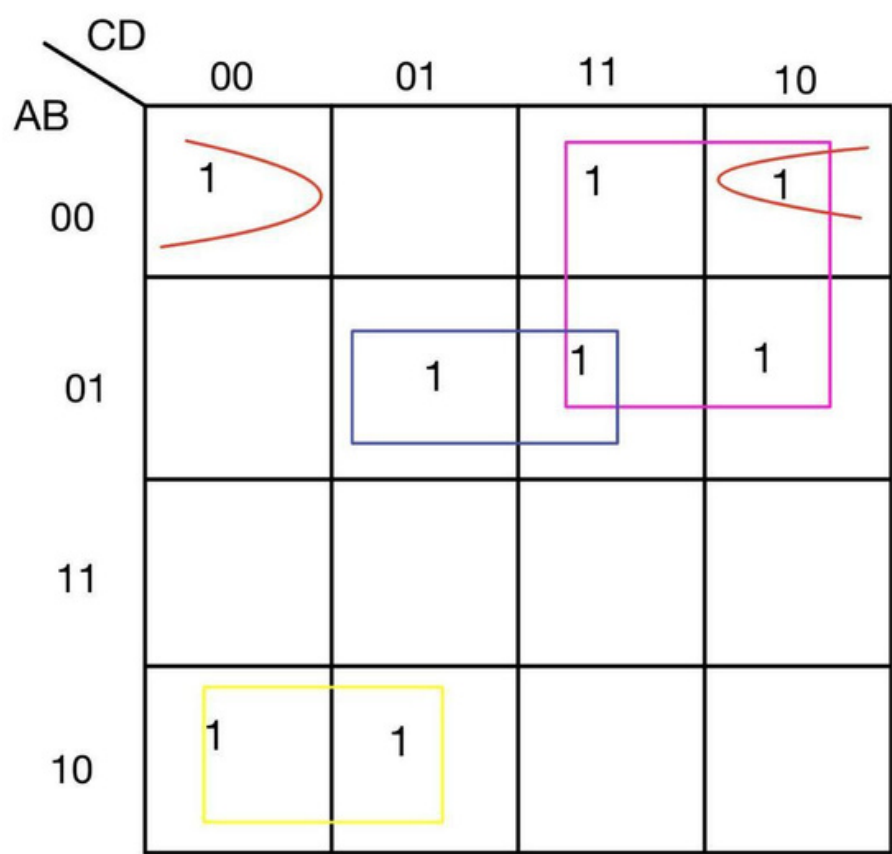
A seven-segment decoder is a digital circuit designed to drive a very common type of digital display device: a set of LED (or LCD) segments that render numerals 0 through 9 at the command of a four-bit code: in Logisim use 7-segment display.



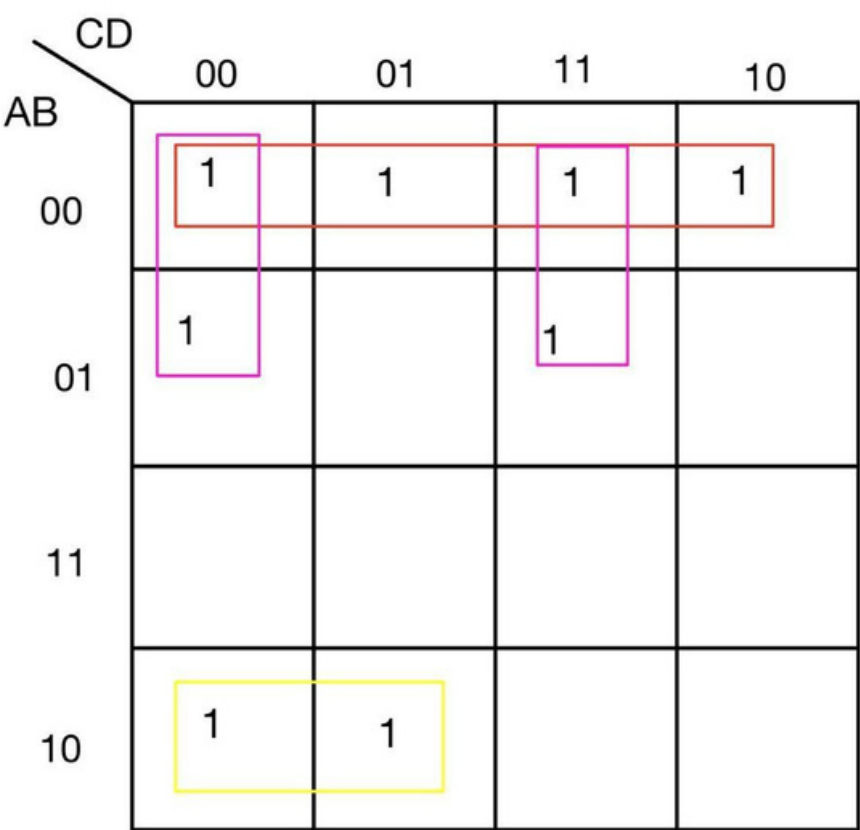
ii. Build a truth table for input and output

A	B	C	D	a	b	c	d	e	f	g
0	0	0	0	1	1	1	1	1	1	0
0	0	0	1	0	1	1	0	0	0	0
0	0	1	0	1	1	0	1	1	0	1
0	0	1	1	1	1	1	1	0	0	1
0	1	0	0	0	1	1	0	0	1	1
0	1	0	1	1	0	1	1	0	1	1
0	1	1	0	1	0	1	1	1	1	1
0	1	1	1	1	1	1	0	0	0	0
1	0	0	0	1	1	1	1	1	1	1
1	0	0	1	1	1	1	1	0	1	1

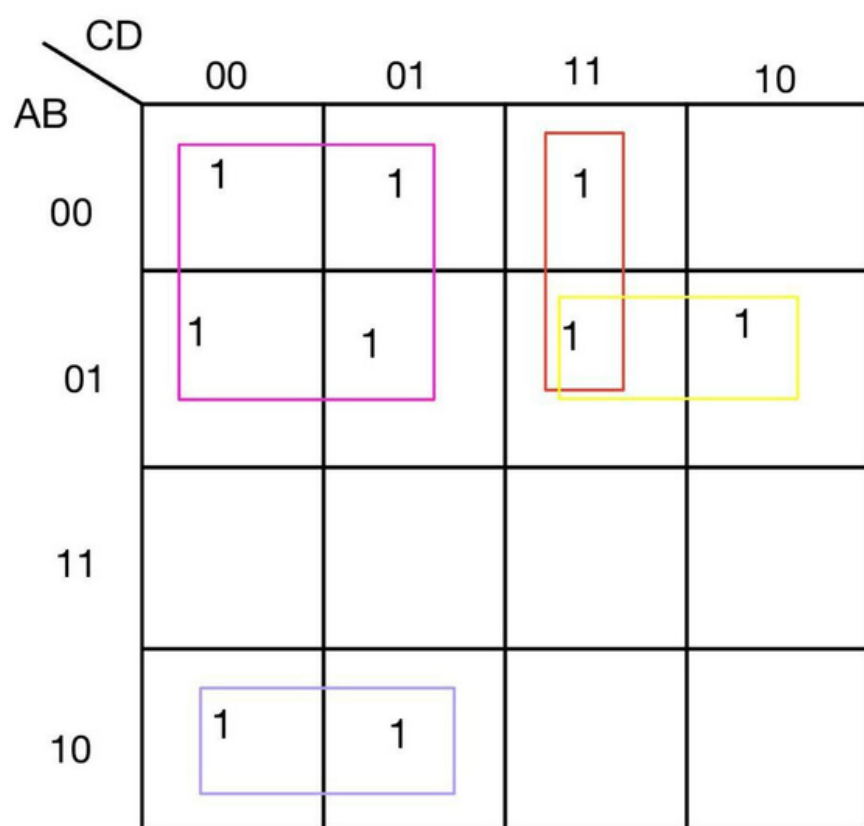
iii. Simplify the function using (K-Map)



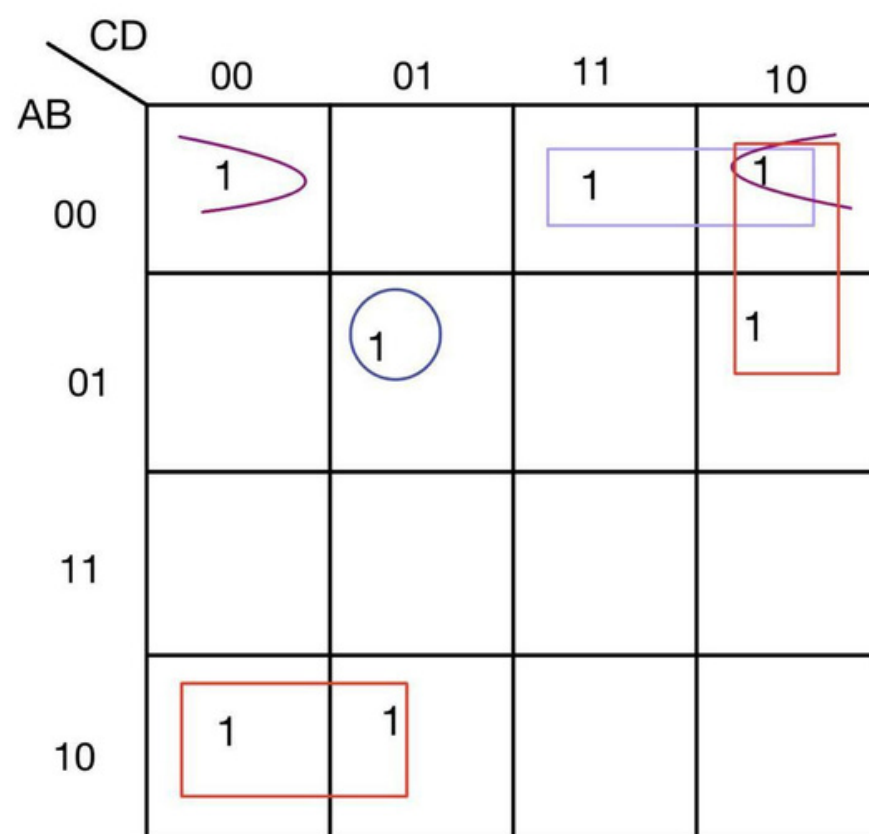
$a=A'C+A'BD+AB'C'+A'B'D'$



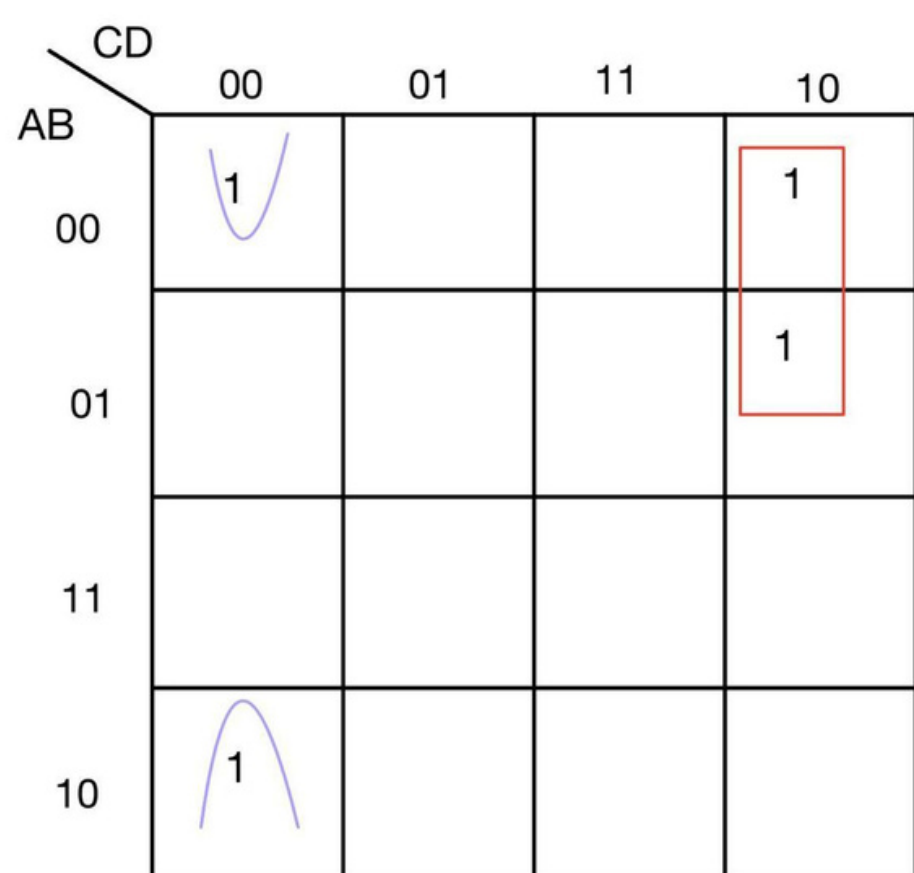
$b=A'B'+A'C'D'+A'CD+AB'C''$



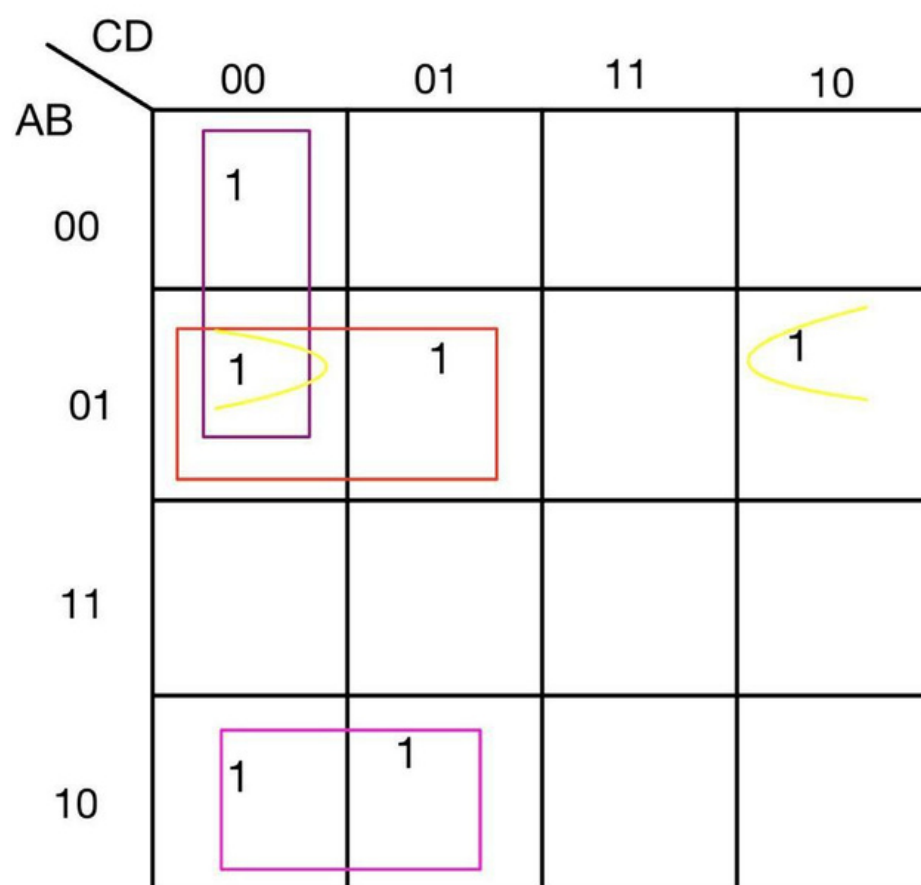
$$c = A'C' + A'CD + A'BC + AB'C'$$



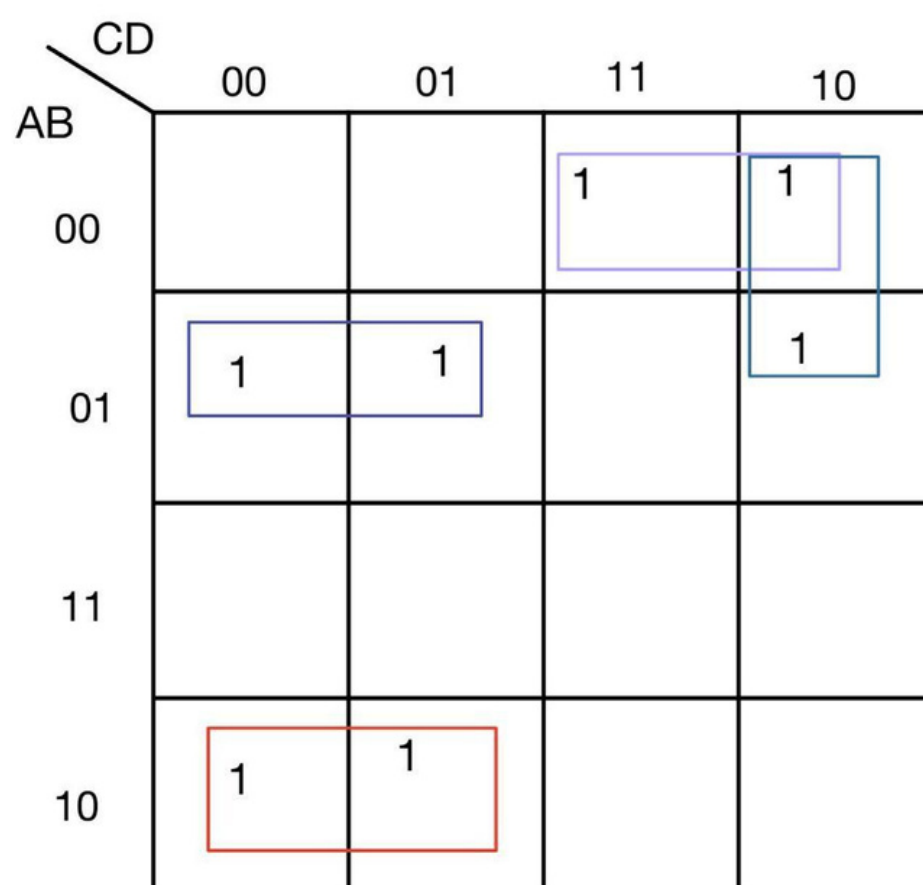
$$d = A'B'C + A'CD' + A'BC'D + AB'C' + A'B'D'$$



$$e = A'CD' + B'C'D'$$

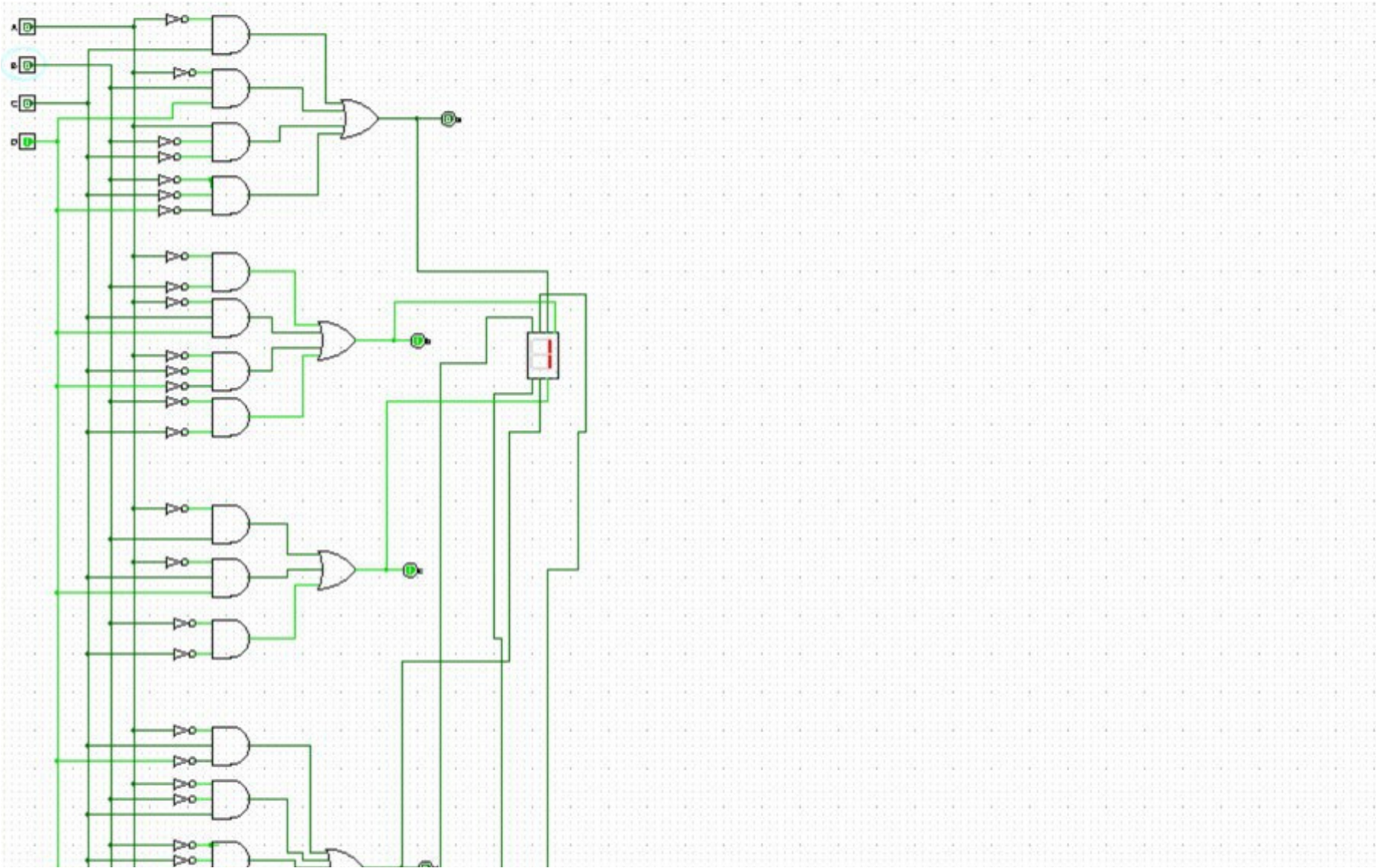
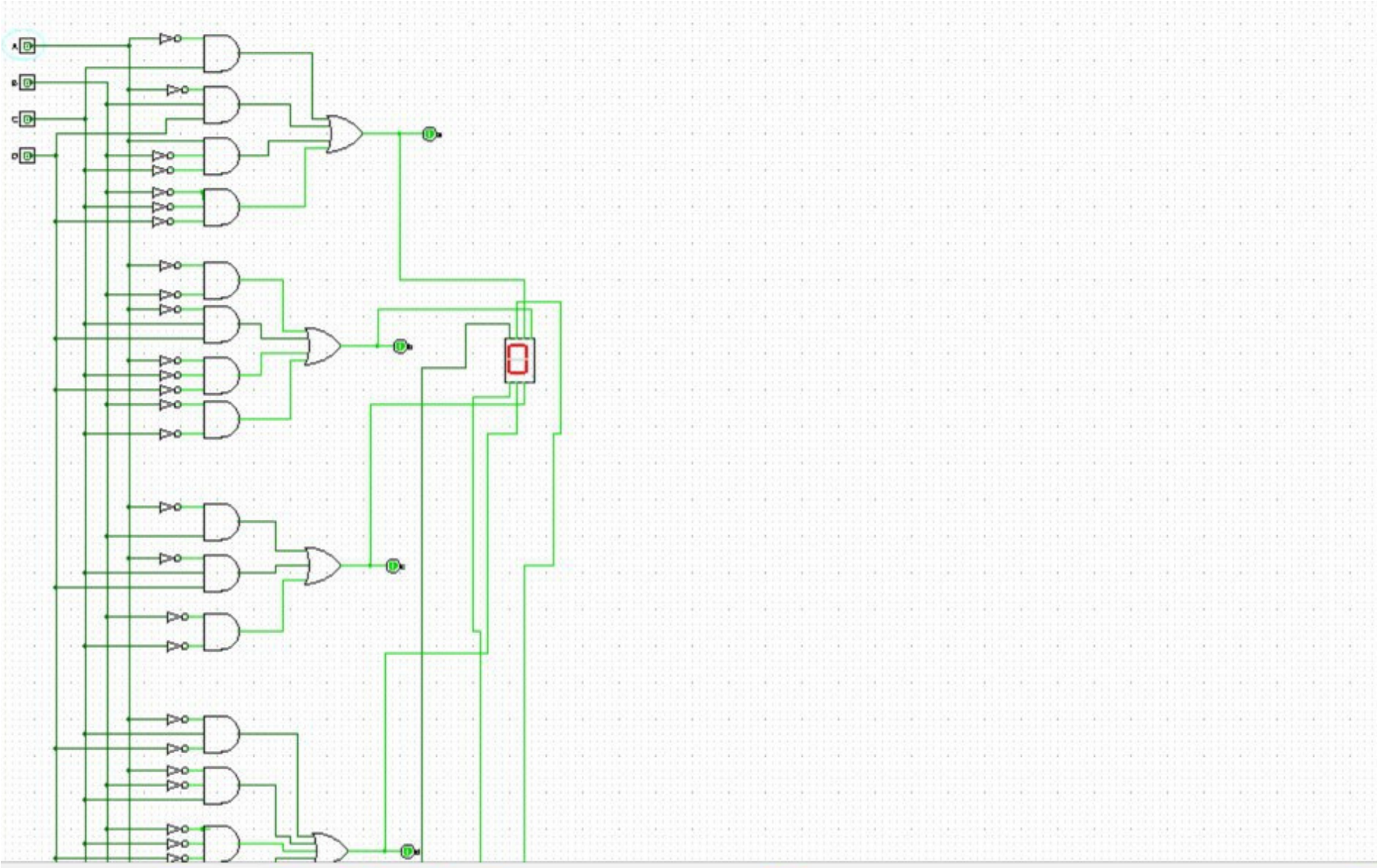


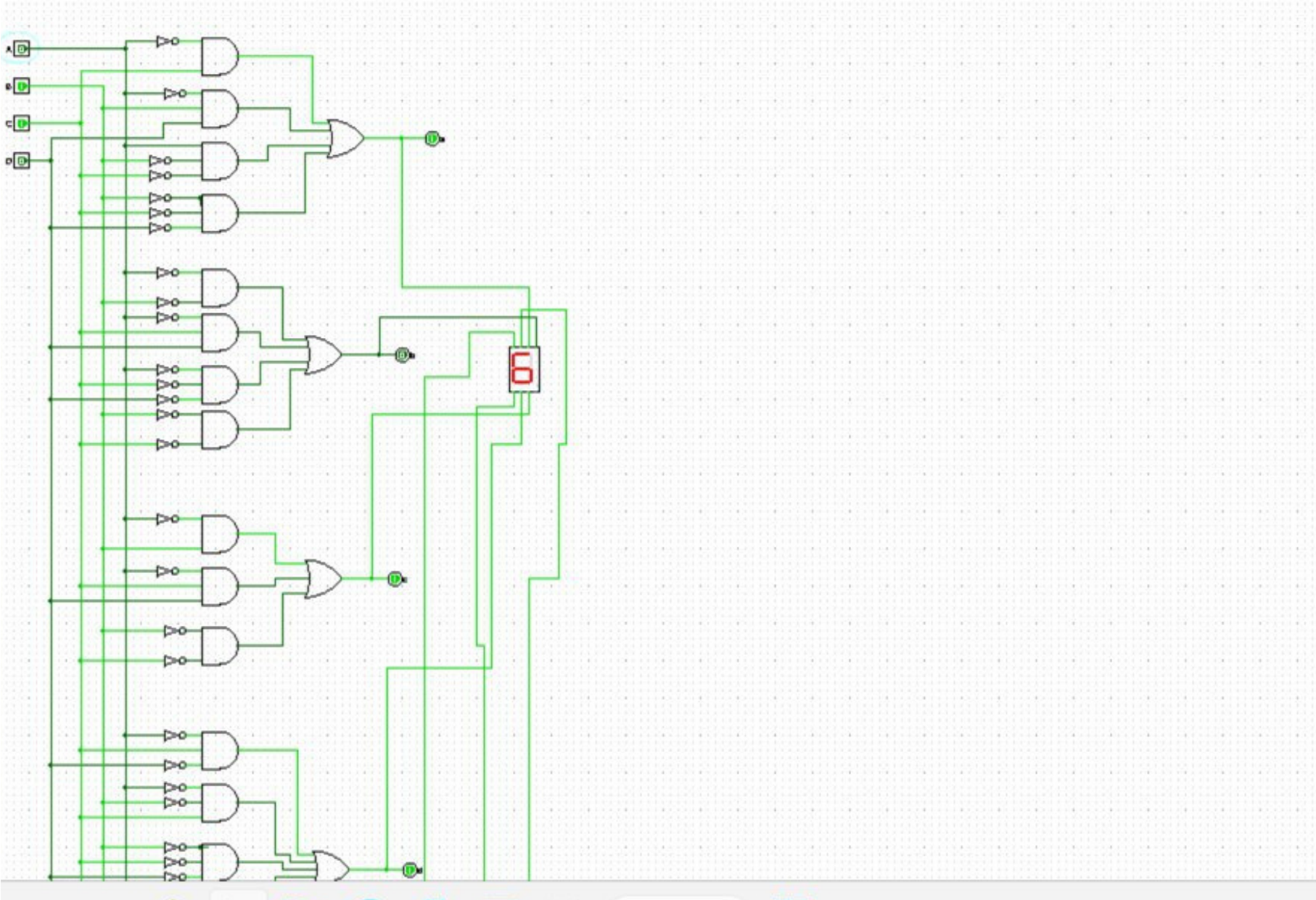
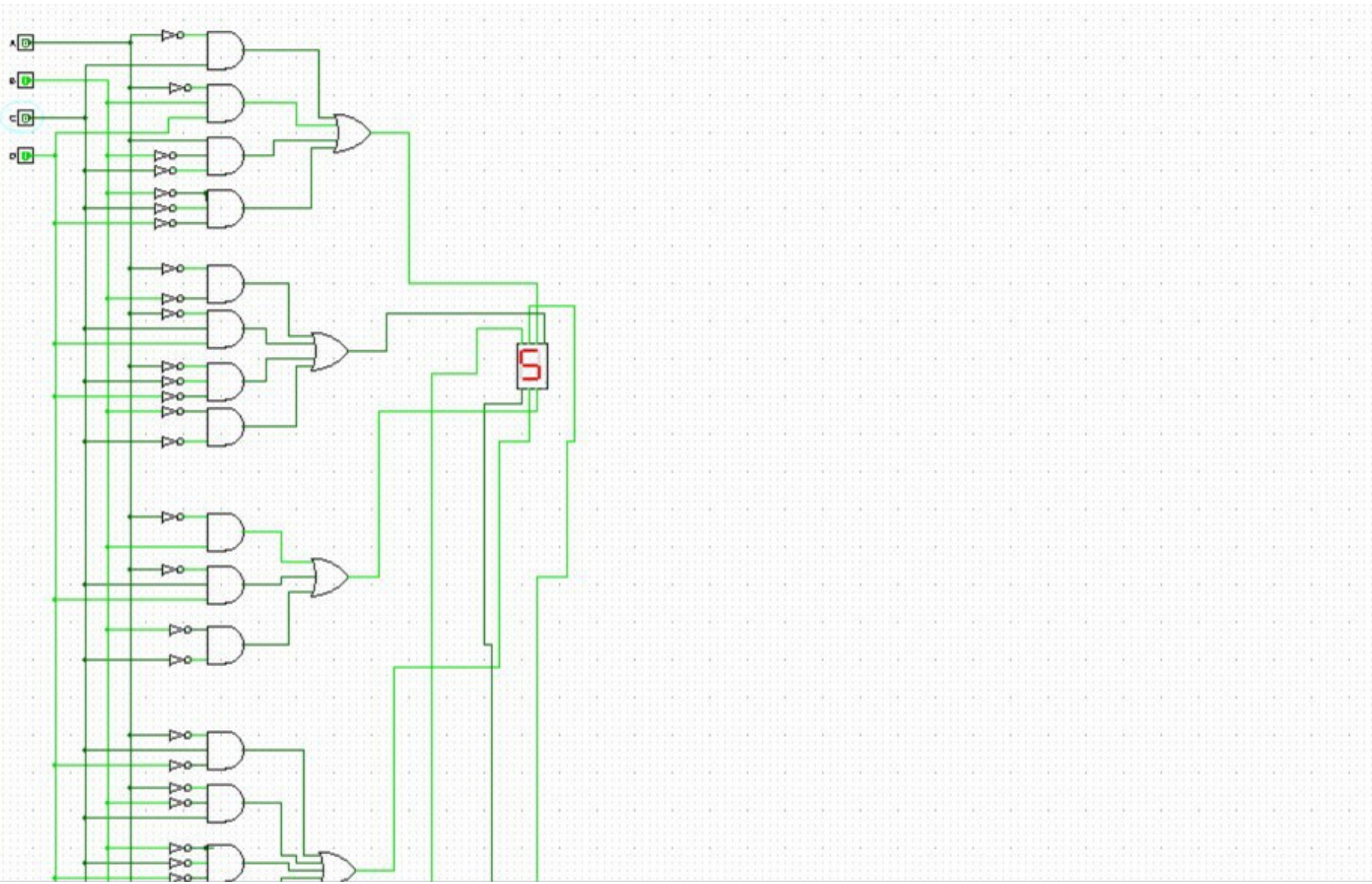
$$f = A'C'D' + A'BC' + A'BD' + AB'C'$$



$$g = A'B'C + A'CD' + A'BC' + AB'C'$$

Draw logic gates





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