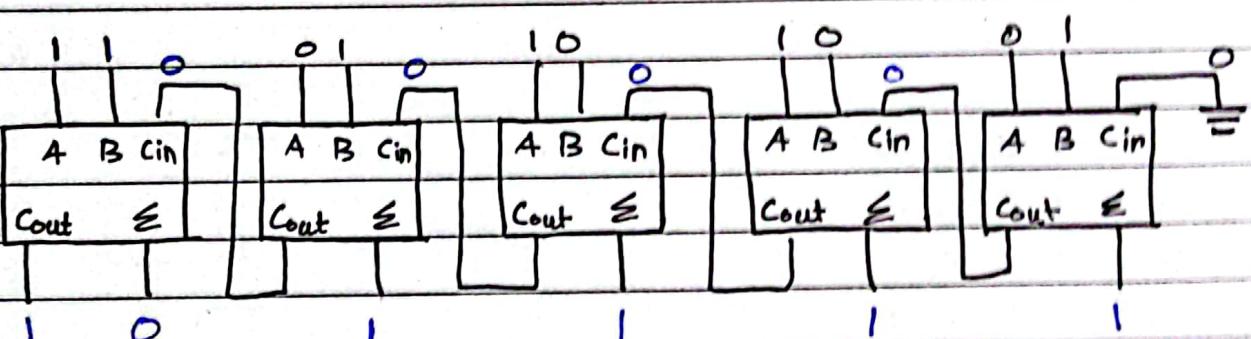
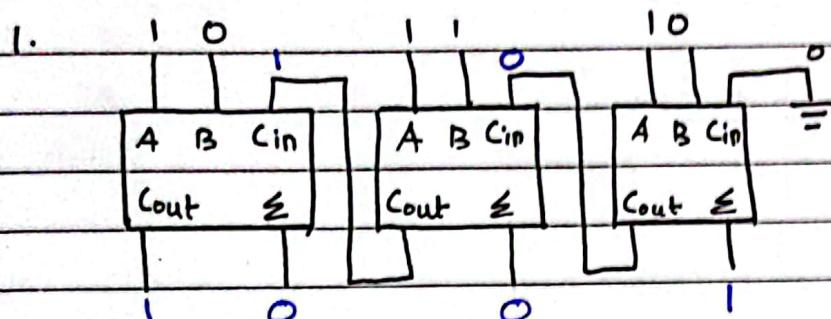


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Assignment - 3



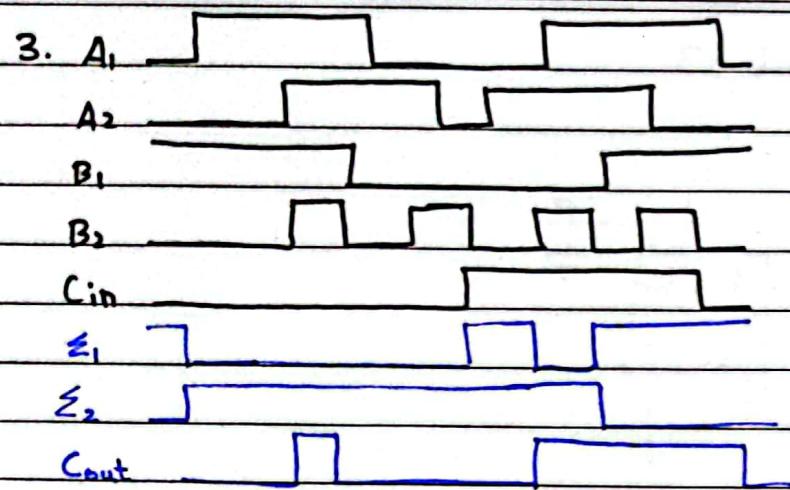
2. $\Sigma_3 = 1$

$\Sigma_2 = 0$

$\Sigma_1 = 1$

$\Sigma_0 = 1$

Date: _____



4. $A_1 \quad 1010$

$A_2 \quad 1100$

$A_3 \quad 0101$

$A_4 \quad 1101$

$B_1 \quad 1001$

$B_2 \quad 1011$

$B_3 \quad 0000$

$B_4 \quad 0001$

$\Sigma_1 \quad 0111$

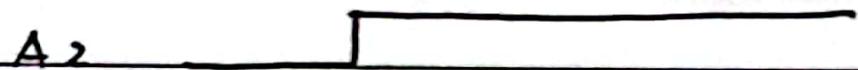
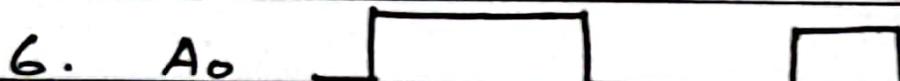
$\Sigma_2 \quad 1011$

$\Sigma_3 \quad 1110$

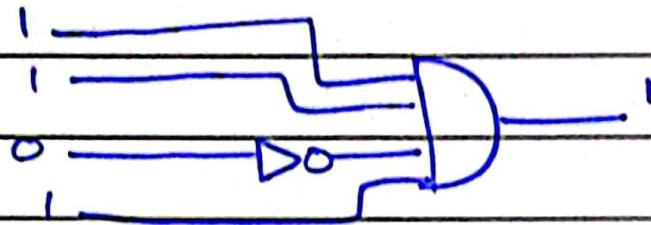
$\Sigma_4 \quad 1000$

$\Sigma_5 \quad 0011$

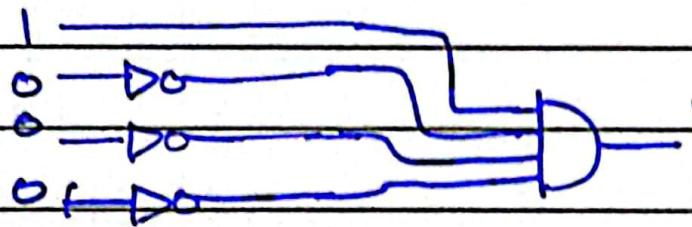
Date:



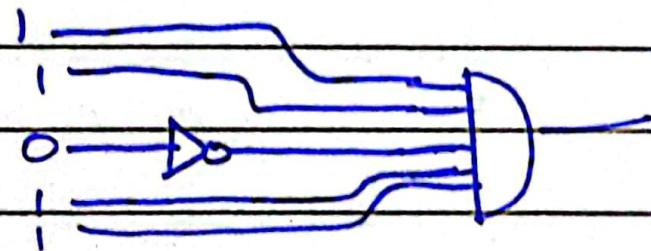
7.a. 1101



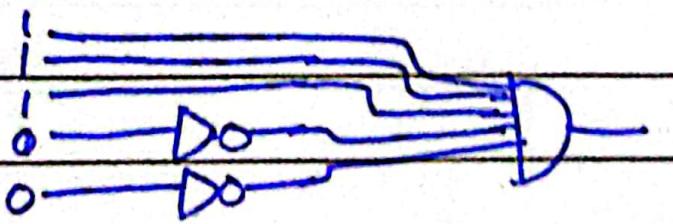
b. 1000



c. 11011

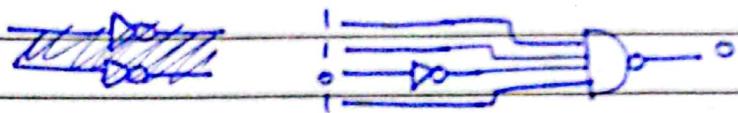


d. 11100

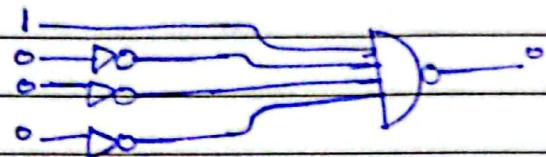


Date: _____

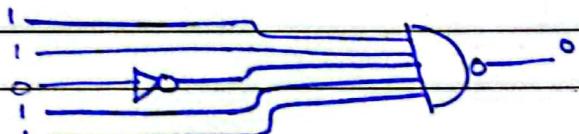
8.a. 1101



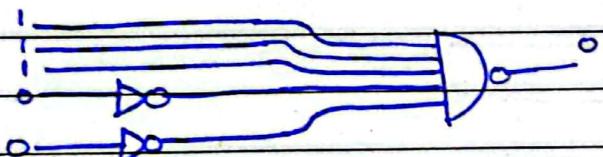
b. 1000



c. 11011



d. 11100



q. 1010, 1100, 0001, 1011

$$A_3 \bar{A}_2 A_1 \bar{A}_0 + A_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 \bar{A}_1 A_0 + A_3 \bar{A}_2 A_1 A_0$$

10. A_0



A_1



A_2



Y



Date: _____

11. A_0

A_1

A_2

A_3

0

1

2

3

4

5

6

7

8

9

12. y_3

y_2

y_1

y_0

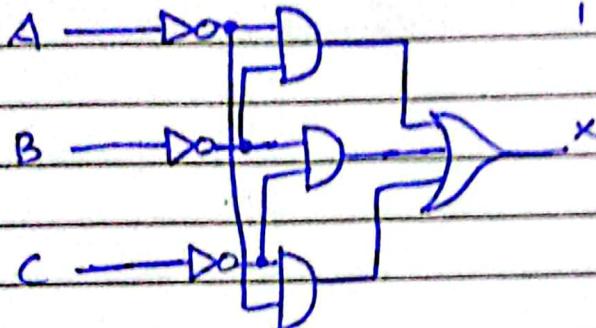
01 639 4 4 4 8 0

13. $A_3 A_2 A_1 A_0 = 1011$, invalid BCD

14. output = 8

Date:

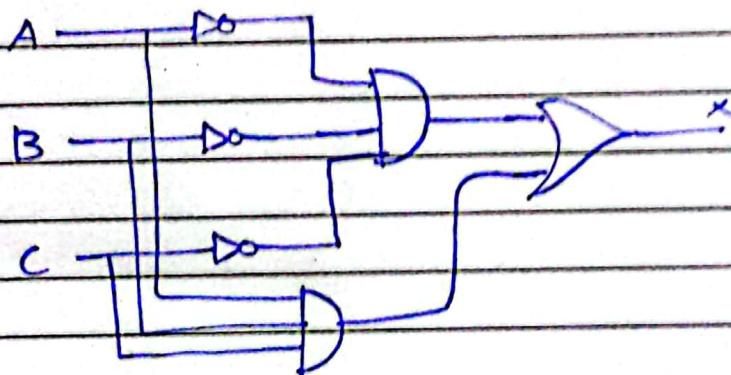
15.



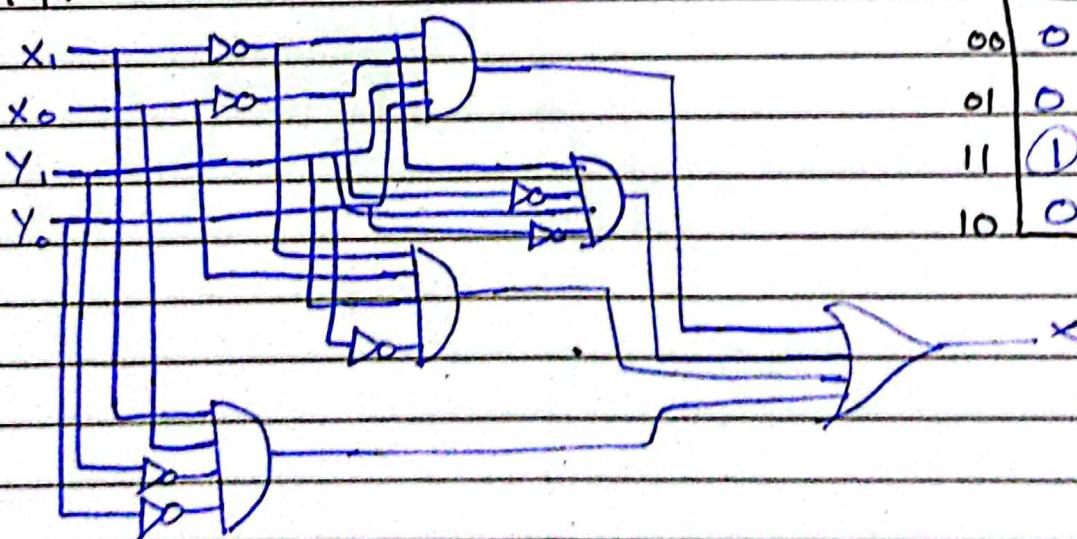
A	B	C	X
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

A	B	C	X
0	0	0	1
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	0

16.



17.



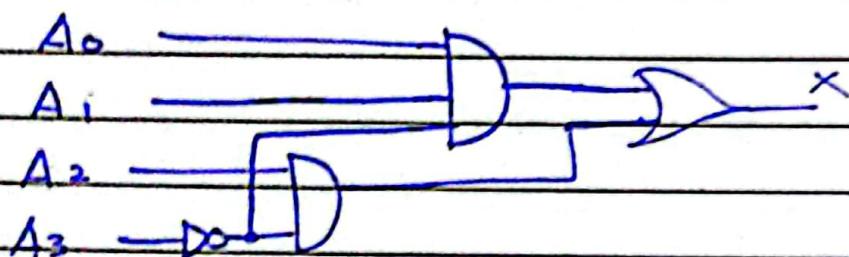
x_1x_0	y_1y_0	00	01	11	10
00	00	0	0	1	0
01	00	0	0	0	1
11	00	1	0	0	0
10	00	0	1	0	0

Date: _____

18. $A_3 A_2$ $\begin{matrix} 00 \\ 01 \\ 11 \\ 10 \end{matrix}$

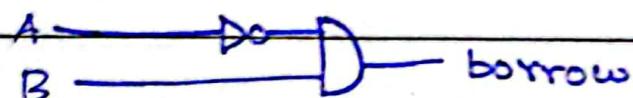
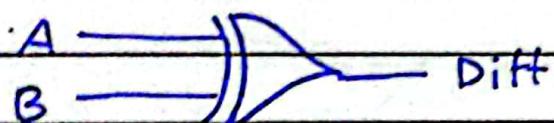
	00	01	11	10
00	0	0	1	0
01	1	1	1	1
11	0	0	0	0
10	0	0	0	0

$$\bar{A}_3 A_2 + \bar{A}_3 \bar{A}_2 A_1 A_0$$



19. A B | Diff borrow

0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0



Date: _____

20. $A_2 \ A_1 \ B_2 \ B_1 \quad A > B \quad A = B \quad A < B$

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

		$A_1 A_0 \ B_2 B_1$			
		00	01	11	10
00		0	0	0	0
01		1	0	0	0
11		1	1	0	1
10		1	1	0	0

$$A_1 \bar{B}_2 \bar{B}_1 + A_2 \bar{B}_2 + A_1 A_2 \bar{B}_2$$

$A < B :$

$$\bar{A}_2 \bar{A}_1 B_1 + \bar{A}_2 B_2 + \bar{A}_1 B_2 B_1$$

		$B_2 B_1$			
		00	01	11	10
00		1	0	0	0
01		0	1	0	0
11		0	0	1	0
10		0	0	0	1

		$B_2 B_1$			
		00	01	11	10
00		0	1	1	1
01		0	0	1	1
11		0	0	0	0
10		0	0	1	0

$$\bar{A}_2 \bar{A}_1 \bar{B}_2 \bar{B}_1 + \bar{A}_2 \bar{A}_1 \bar{B}_2 B_1 + A_2 \bar{A}_1 B_2 \bar{B}_1 + A_2 A_1 B_2 B_1$$

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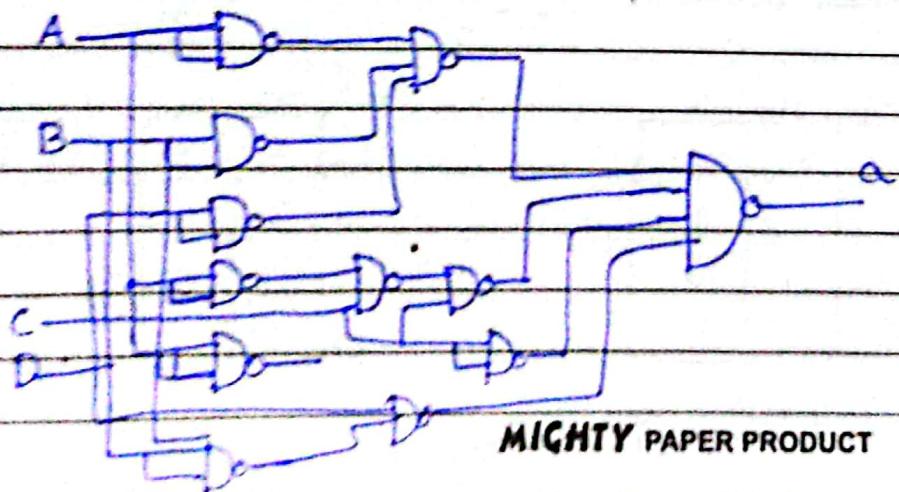
Date: _____

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

a = AB

	00	01	11	10
00	1	0	1	1
01	0	1	1	1
11	0	0	0	0
10	1	1	0	0

$$a = \bar{A}C + A\bar{B}\bar{C} + \bar{B}\bar{C}\bar{D} + \bar{A}BD$$



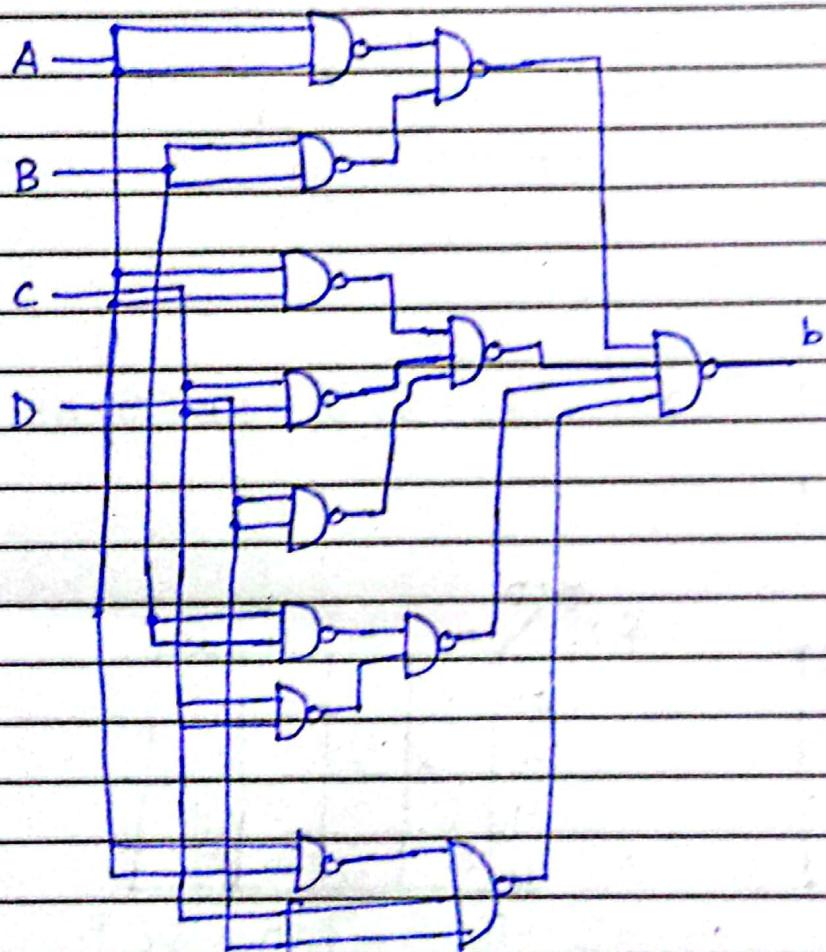
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Date: _____

b : AB CD

AB	CD	00	01	11	10
00		1	0	0	1
01		0	1	0	0
11		0	0	0	0
10		1	1	0	0

$$\bar{A}\bar{B} + \bar{A}\bar{C}\bar{D} + \bar{B}\bar{C} + \bar{A}\bar{C}D$$

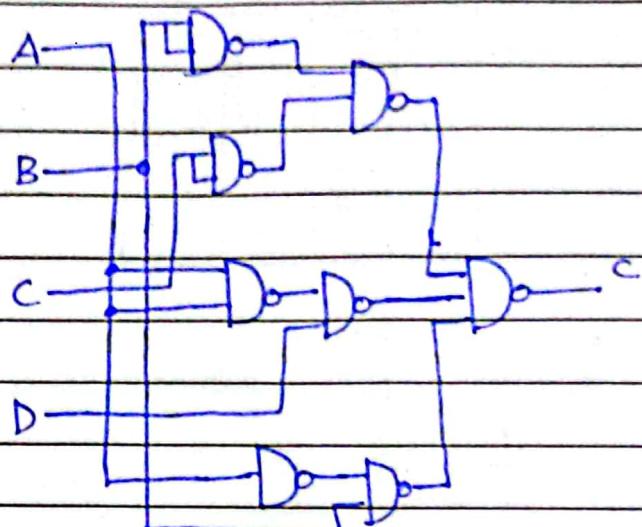


Date: _____

c : AB \ CD

	00	01	11	10
00	1	1	1	0
01	1	1	1	1
11	0	0	0	0
10	1	1	0	0

$$\bar{B}\bar{C} + \bar{A}D + \bar{A}\bar{B}$$



d : AB \ CD

	00	01	11	10
00	1	0	1	1
01	0	1	0	1
11	0	0	0	0
10	1	1	0	0

$$\bar{A}\bar{B}\bar{D} + \bar{A}\bar{B}\bar{C} + \bar{A}C\bar{D} + \bar{A}B\bar{C}D + A\bar{B}\bar{C}$$

e. AB \ CD

	00	01	11	10
00	1	0	0	1
01	0	0	0	1
11	0	0	0	0
10	1	0	0	0

$$\bar{A}C\bar{D} + \bar{B}\bar{C}\bar{D}$$

f: AB \ CD

	00	01	11	10
00	1	0	0	0
01	1	1	0	1
11	0	0	0	0
10	1	1	0	0

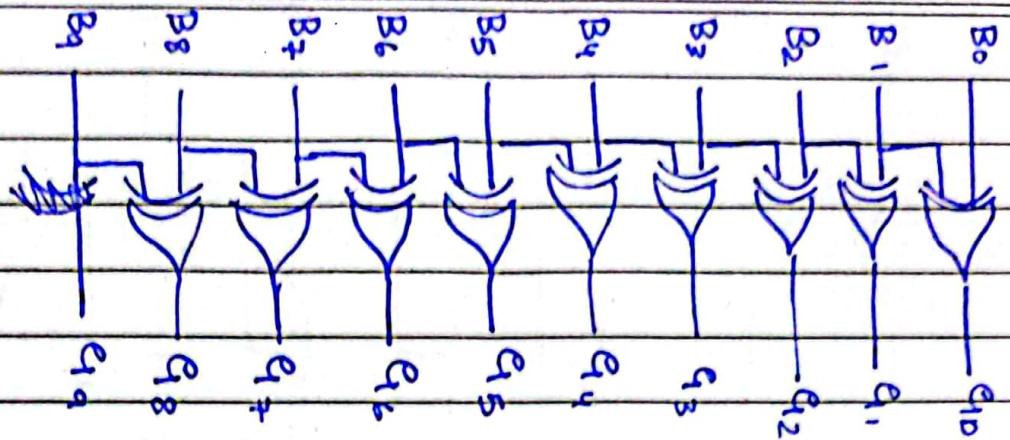
$$\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}B\bar{D} + \bar{A}\bar{C}\bar{D}$$

g: AB \ CD

	00	01	11	10
00	0	0	1	1
01	1	1	0	1
11	0	0	0	0
10	1	1	0	0

$$\bar{A}\bar{B}C + A\bar{B}\bar{C} + \bar{A}BC + \bar{A}C\bar{D}$$

22.



a. 1010111100

11111000010

b. 11110000011

10001000010

c. 1011110011

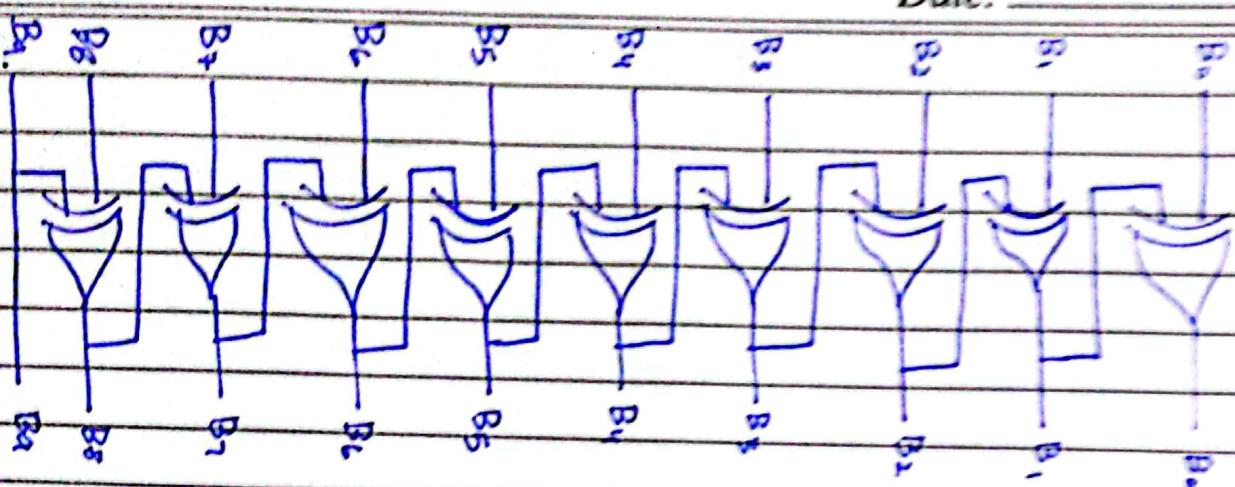
1110001010

d. 10000000001

11000000001

Date: _____

23.



a. 1010111100
1100101000

~~11100010~~

b. 1111000011
1010000010

c. 1011110011
1101011101

d. 1000000001
1111111110

Date: _____

24. $D_0 = 0, D_1 = 0, D_2 = 0, D_3 = 1$

a. $S_0 = 0, S_1 = 1$

output = $D_2 = 0$

c. $S_0 = 1, S_1 = 0 \quad X = D_0\bar{S}_1\bar{S}_0 + D_1\bar{S}_1S_0 + D_2S_1\bar{S}_0 + D_3S_1S_0$

output = $D_1 = 1$

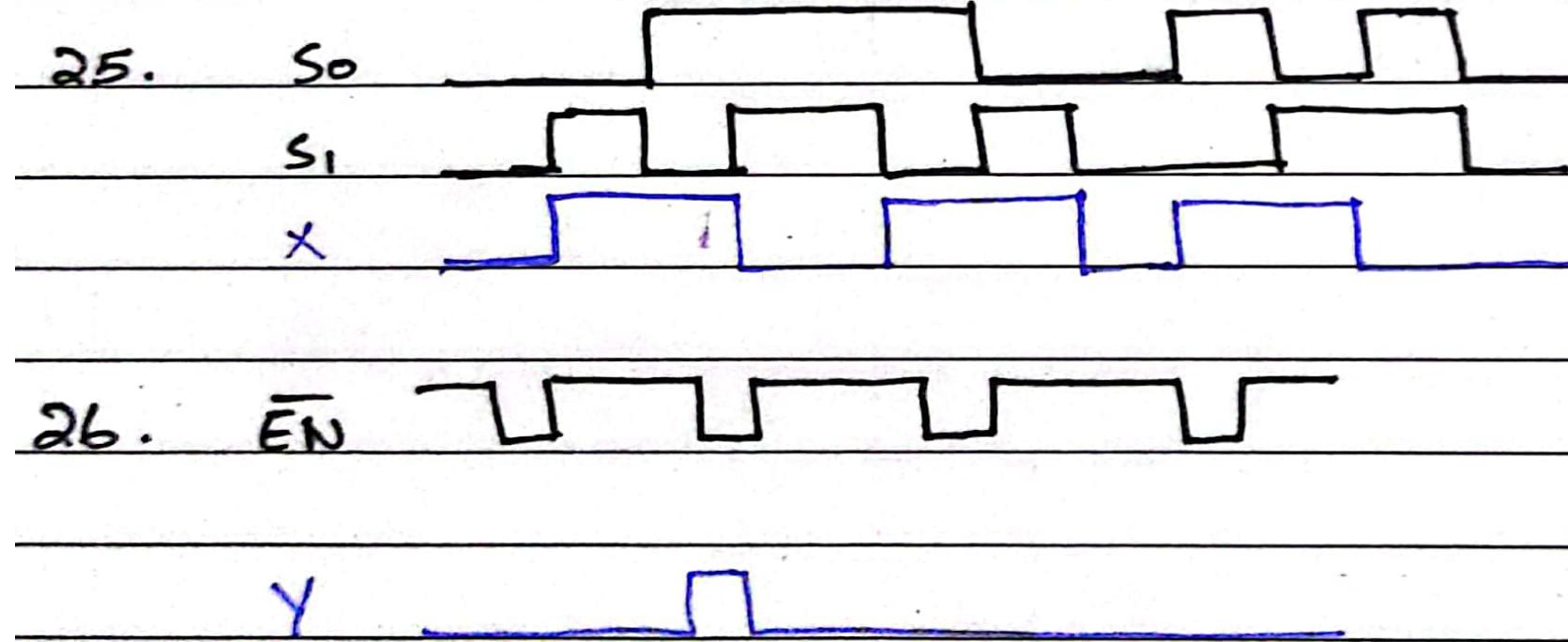
25. s_0

s_1

x

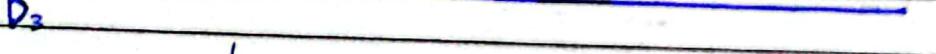
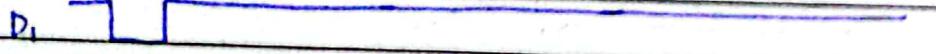
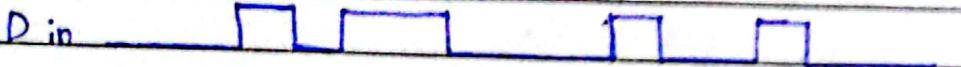
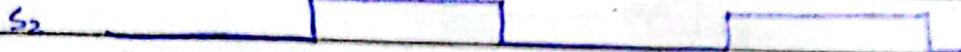
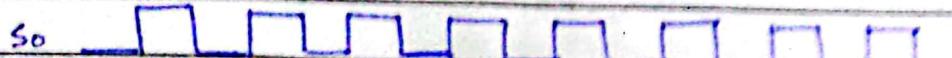
26. $\bar{E}N$

y

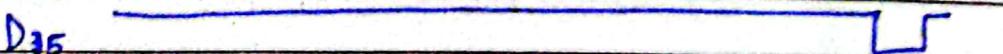
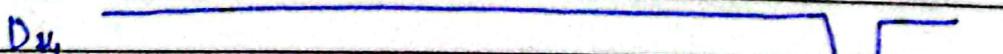
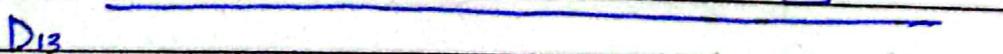
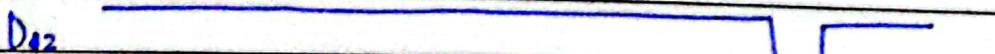
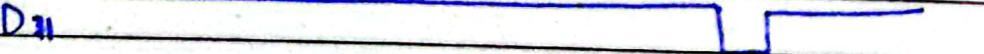
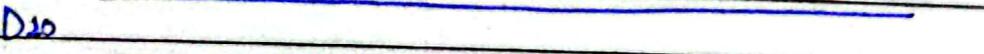
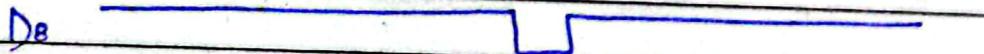


Date: _____

27.

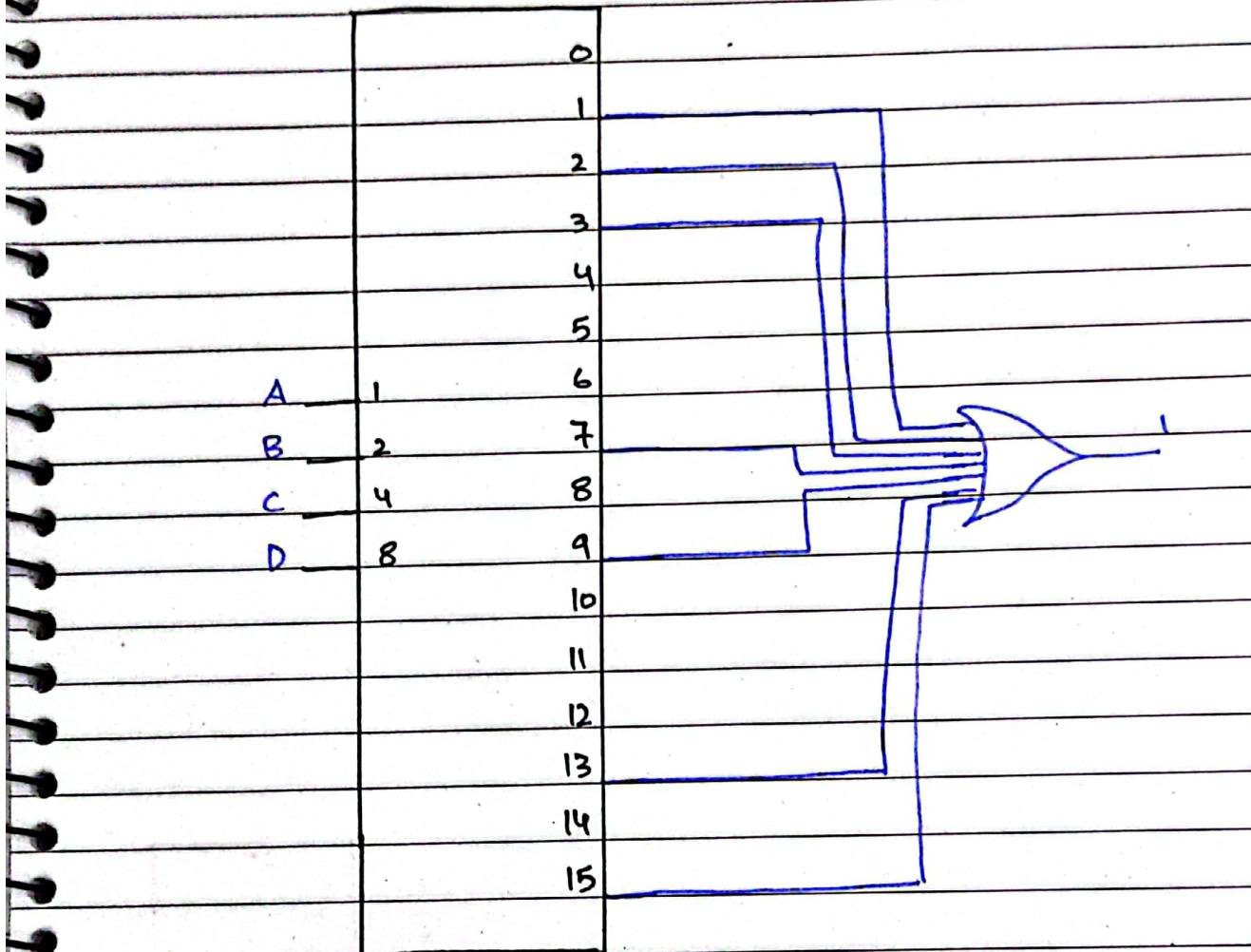


1



Date: _____

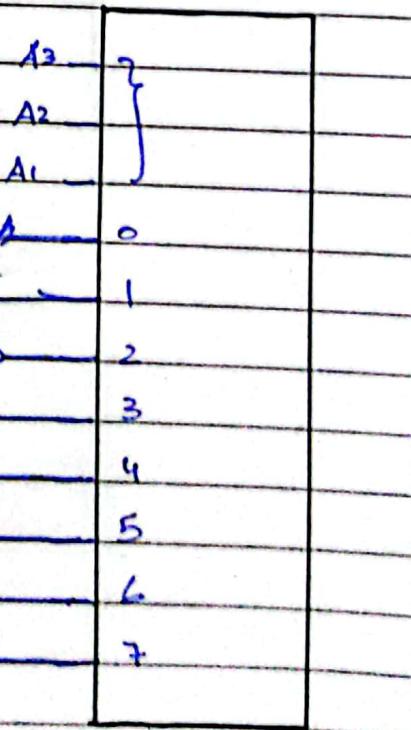
28. $F(A, B, C, D) = \Sigma(1, 2, 3, 7, 9, 13, 15)$



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$$29. \times (A_3, A_2, A_1, A_0) = \Sigma (2, 3, 4, 8, 9, 13, 15)$$

	A_3	A_2	A_1	A_0	x	
0	0	0	0	0	0	$x=0$
0	0	0	0	1	0	
1	0	0	1	0	1	$x=1$
2	0	1	0	0	1	$x=\bar{A}_0$
2	0	1	0	1	0	
3	0	1	1	0	0	$x=0$
3	0	1	1	1	0	
4	1	0	0	0	1	$x=1$
4	1	0	0	1	1	
5	1	0	1	0	0	$x=0$
5	1	0	1	1	0	
6	1	1	0	0	0	$x=A_0$
6	1	1	0	1	1	
7	1	1	1	0	0	$x=A_0$
7	1	1	1	1	1	

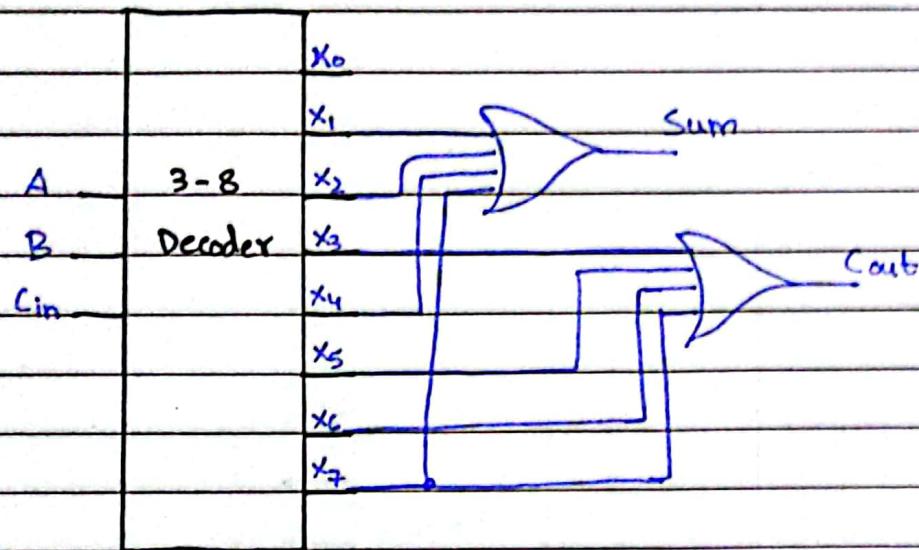


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30. a. full adder using 3-to-8 line Decoder

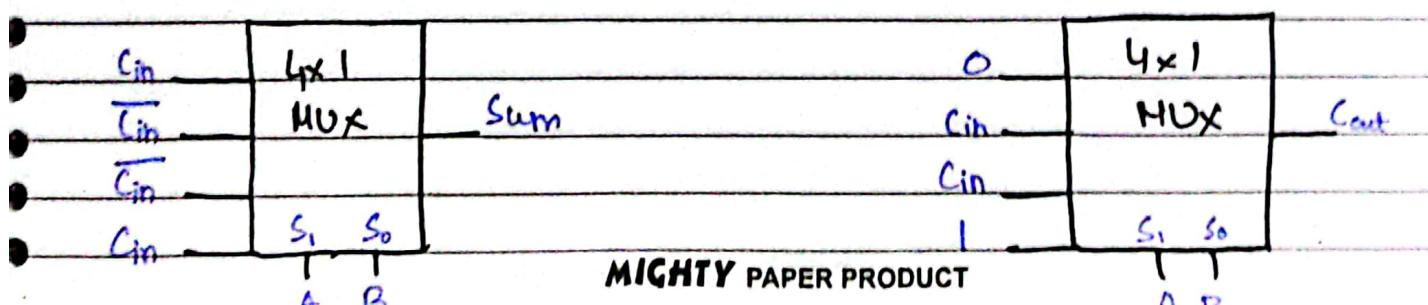
$$\text{Sum} = (x_1, x_2, x_4, x_7)$$

$$\text{Cout} = (x_3, x_5, x_6, x_7)$$



b. full adder using 4x1 multiplexers

A	B	Cin	S	Cout	Sum		AB	Cin	AB	Cout
0	0	0	0	0	00 01 11 10		00 01 11 10		00 01 11 10	
0	0	1	1	0	0 0 1 0 1		0 0 0 1 0		0 0 0 1 0	
0	1	0	1	0	1 1 0 1 0		1 0 1 1 1		1 0 1 1 1	
0	1	1	0	1	A B	Cin	A B	Cin	A B	Cin
1	0	0	1	0	0 0	Cin	0 0	Cin	0 0	Cin
1	0	1	0	1	0 1	Cin	0 1	Cin	0 1	Cin
1	1	0	0	1	1 0	Cin	1 0	Cin	1 0	Cin
1	1	1	1	1	1 1	Cin	1 1	Cin	1 1	Cin



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31.

