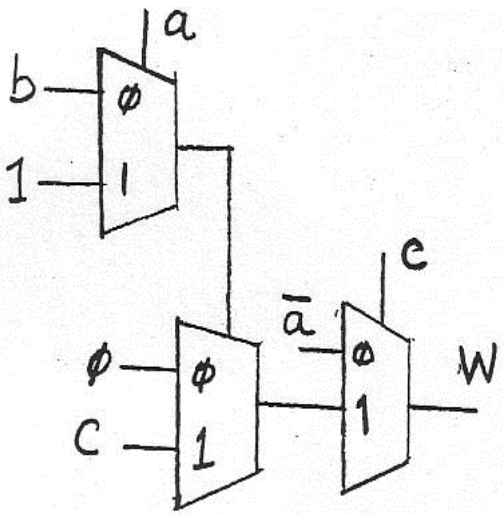
TEXAS TECH UNIVERSITY™
Department of Electrical and Computer Engineering

ECE 2372, Spring 2017
(Modern Digital System Design)

Instructor:
Dr. Tooraj Nikoubin

Review for SECOND TEST

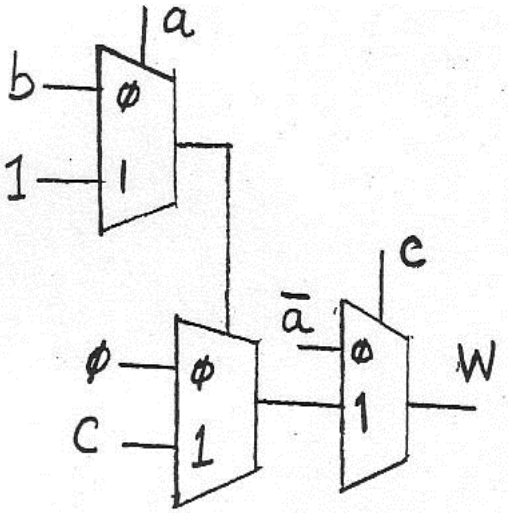


$\bar{a}b + a \oplus b$

$\bar{a} \oplus c + bc$

$ab + \bar{a}c + a\bar{c}$

$\bar{a}\,\bar{c} + c(a + b + c)$



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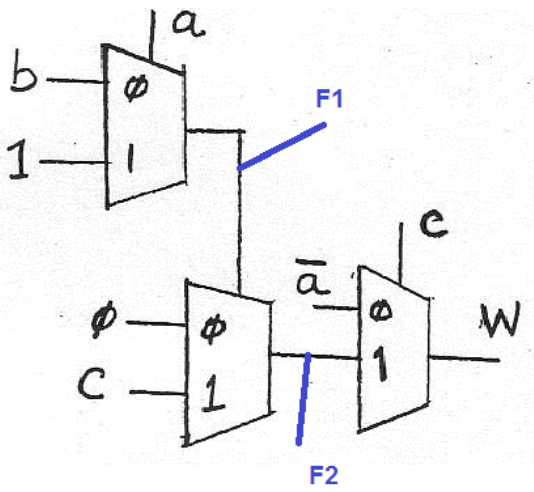

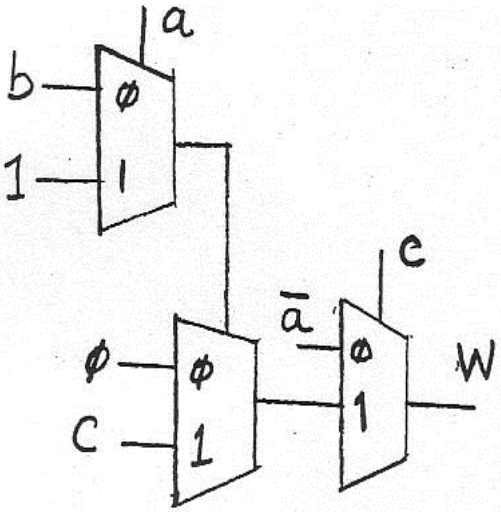

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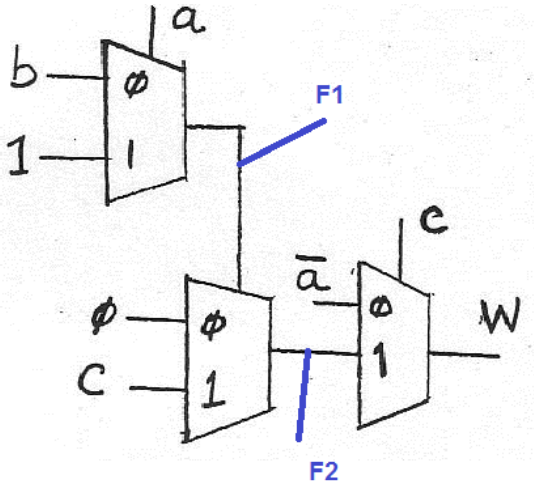

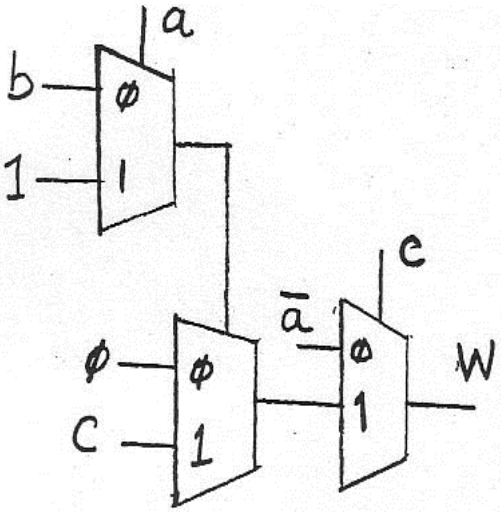

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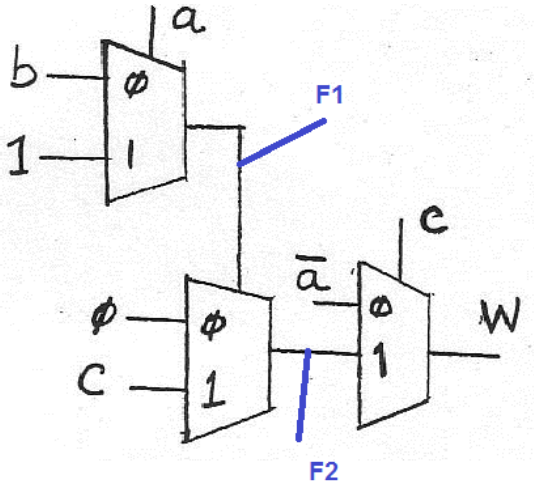

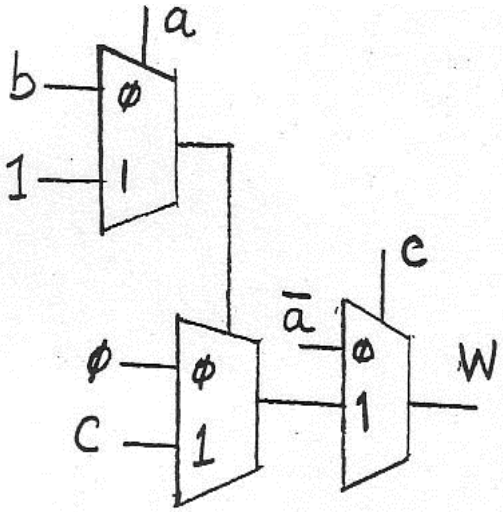

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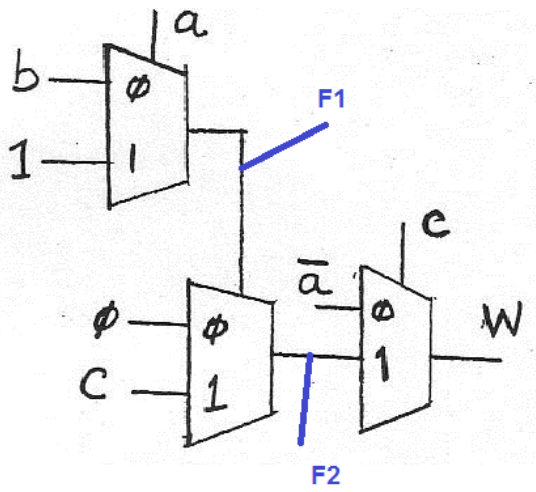

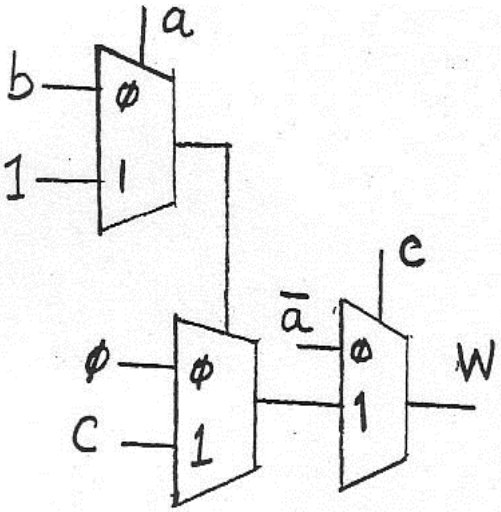

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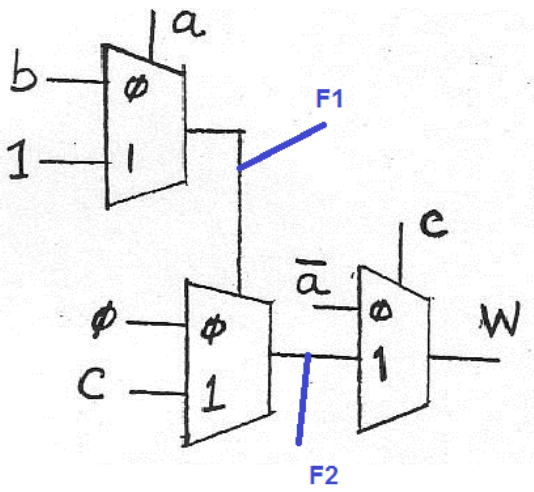

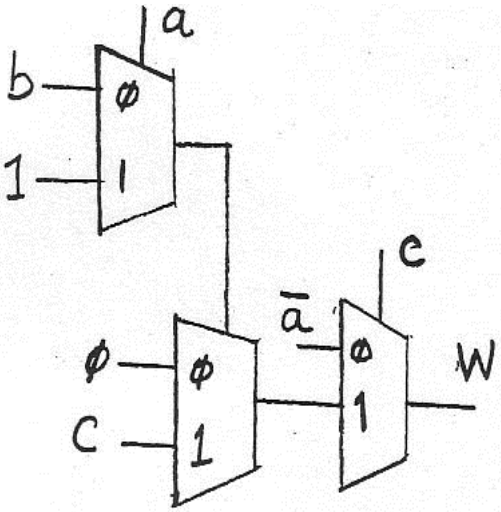

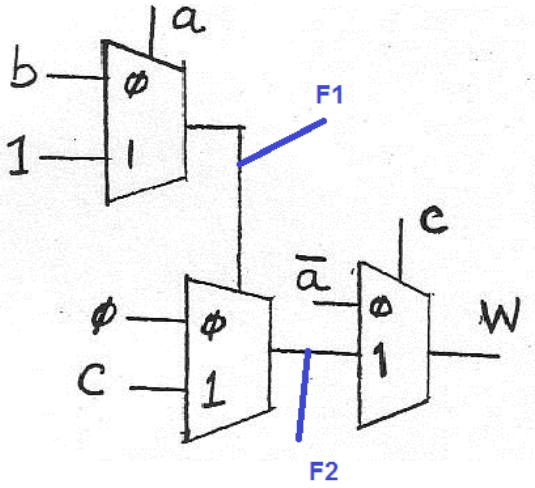

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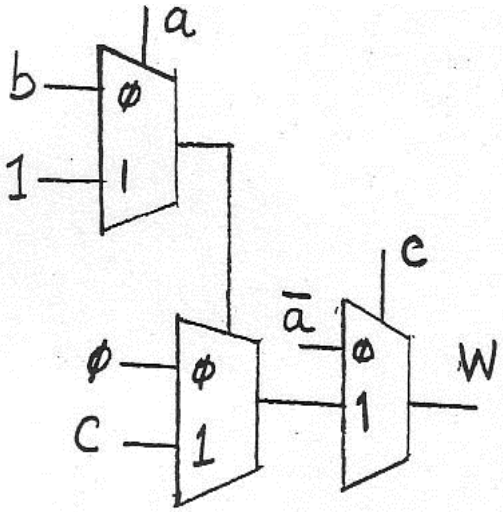

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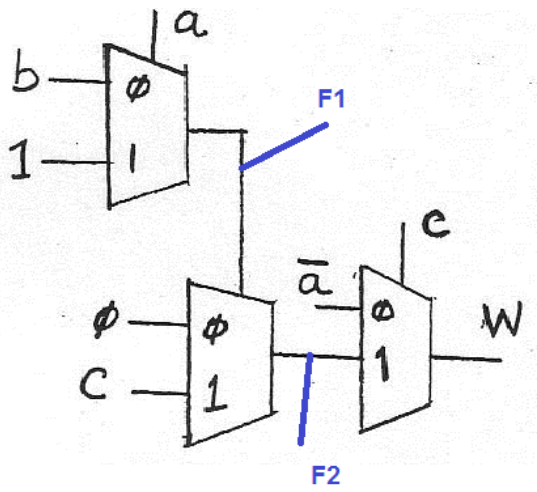

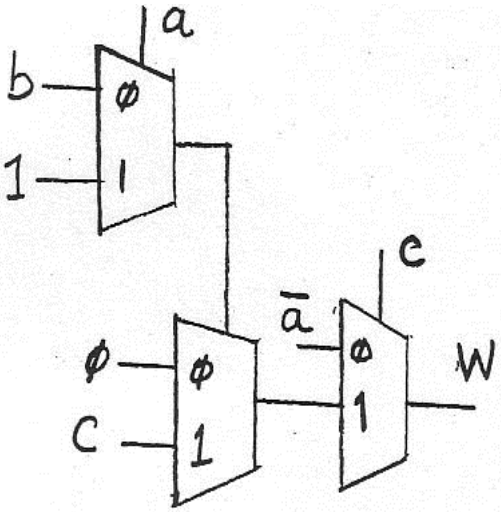

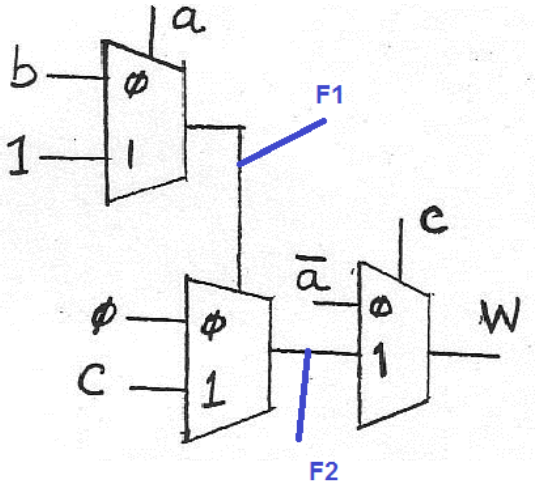

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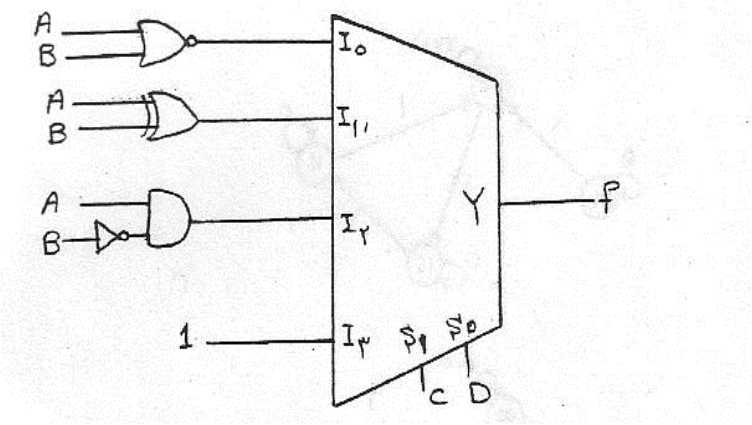
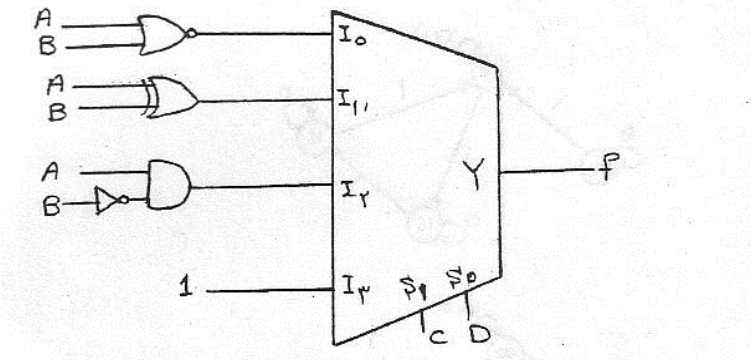


$$F = \sum_m$$

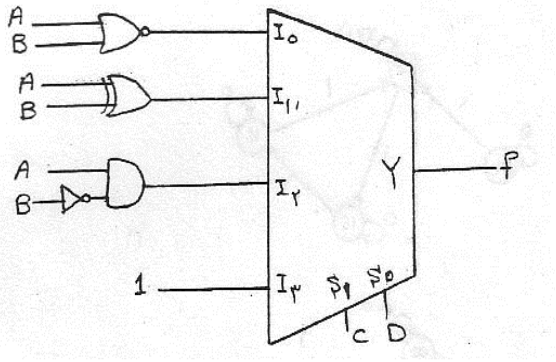


$$I0 = \overline{A + B} = \overline{A}\,\overline{B}$$

$$I1 = A \oplus B = A\overline{B} + \overline{A}B$$

$$I2 = A\overline{B}$$

$$I3 = 1$$



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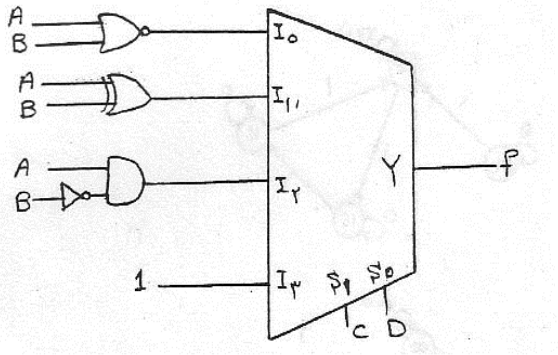
$$I3 = 1$$

D	0	1	0	1
C	0	0	1	1
AB				
00	0	1	2	3
01	4	5	6	7
11	12	13	14	15
10	8	9	10	11



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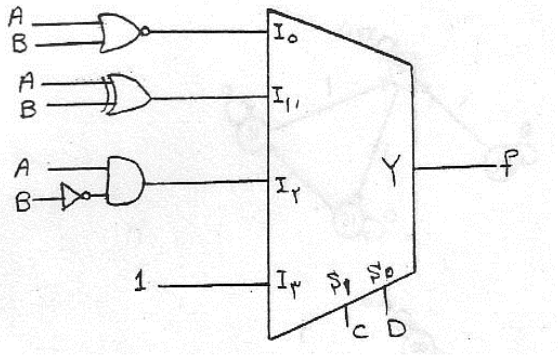

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AB				
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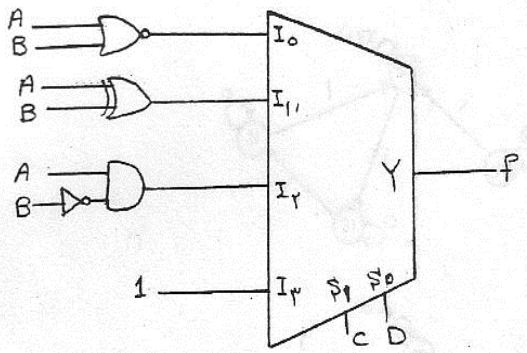

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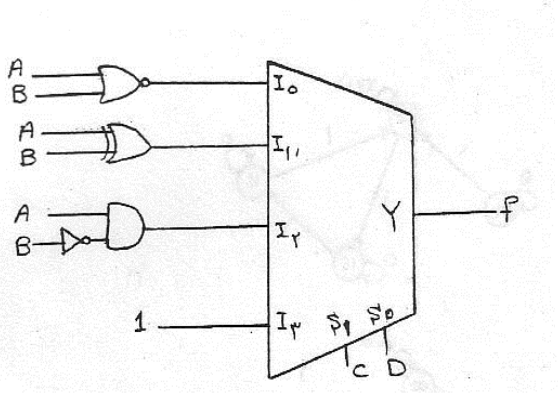

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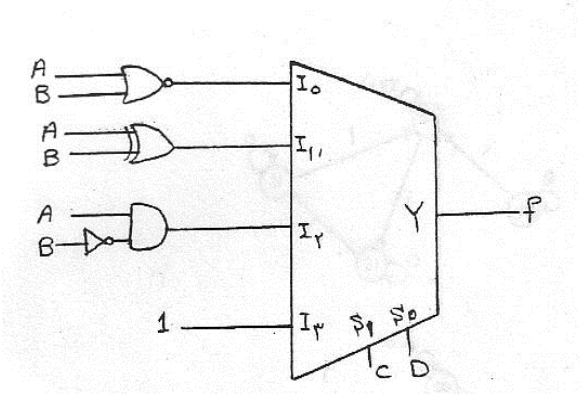
C	0	0	1	1
AB				
00	0	1	2	3
01	4	5	6	7
11	12	13	14	15
10	8	9	10	11



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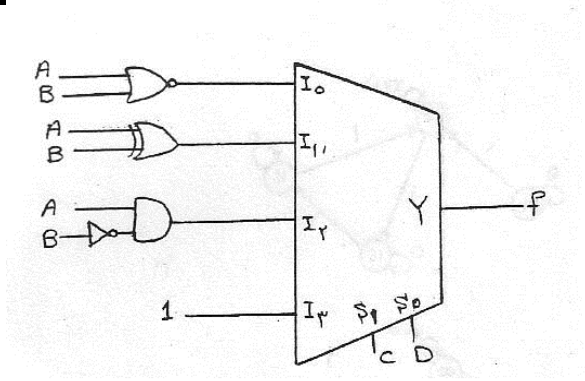
C	0	0	1	1
AB				
00	0	1	2	3
01	4	5	6	7
11	12	13	14	15
10	8	9	10	11

$$Y = \sum m(o, 3, 5, 9, 10, 11, 15)$$



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C	0	0	1	1
AB				
00	0	1	2	3
01	4	5	6	7
11	12	13	14	15
10	8	9	10	11

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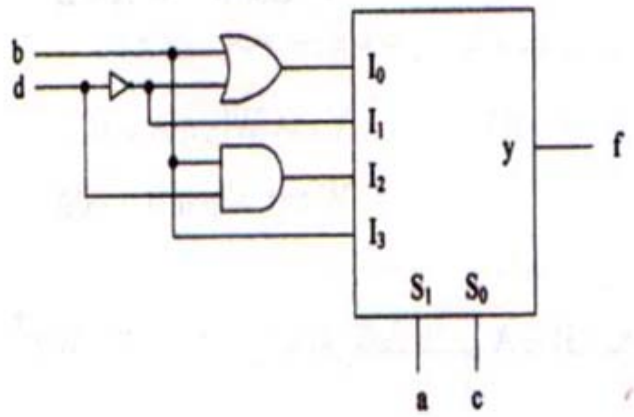
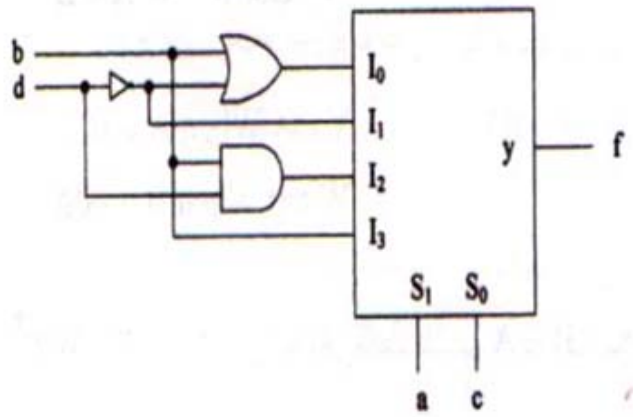


$$I0 = b + \overline{d}$$

$$I1 = \overline{d}$$

$$I2 = bd$$

$$I3 = b$$



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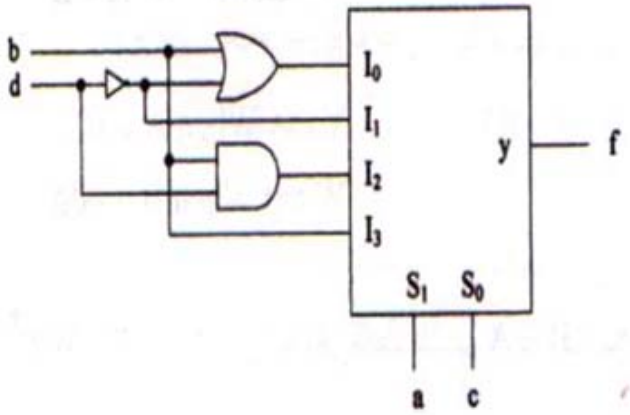
$$I1 = \overline{d}$$

$$I2 = bd$$

$$I3 = b$$

	c	0	1	0	1
	a	0	0	1	1
bd					
00		0	2	8	10
01		1	3	9	11
11		5	7	13	15
10		4	6	12	14



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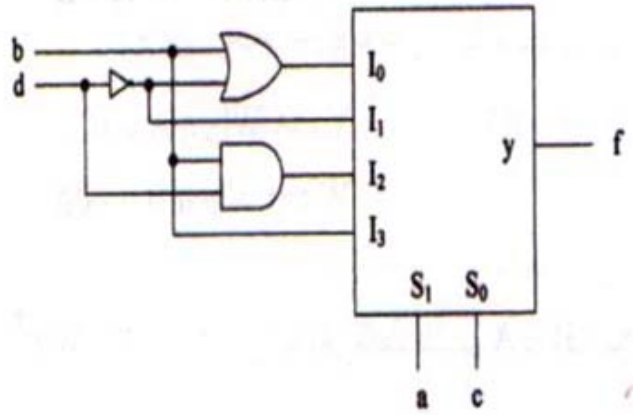
a	0	0	1	1
bd				
00	0	2	8	10
01	1	3	9	11
11	5	7	13	15
10	4	6	12	14



$$I0 = b + \overline{d}$$

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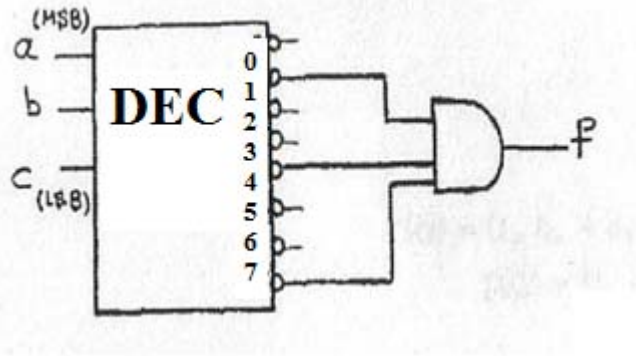
$$I3 = b$$

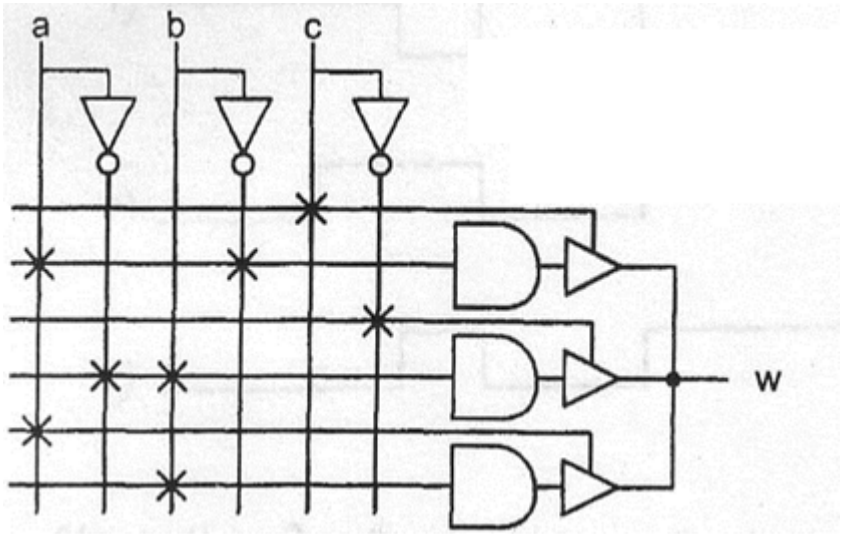
bd \ ca	00	01	11	10
00	0	2	8	10
01	1	3	9	11
11	5	7	13	15
10	4	6	12	14

$$Y = \sum m(o, 2, 4, 5, 6, 13, 14, 15)$$

(2)



$$Y = \sum m(o, 2, 3, 5, 6)$$



a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	x	x	x

2)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	1	0	1	1	1	1	1	1

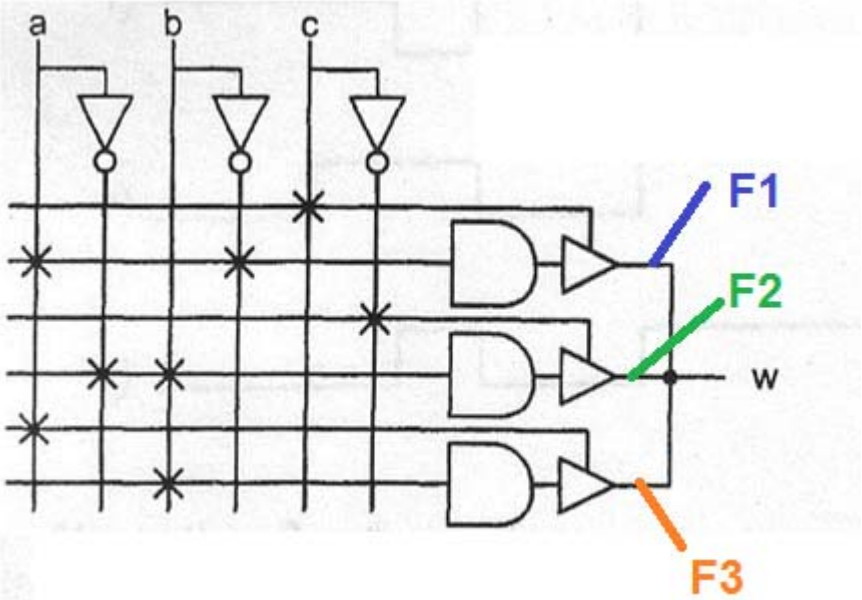
1)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	0	0	0

4)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	1	x	1

3)



2)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	x	x	x

1)

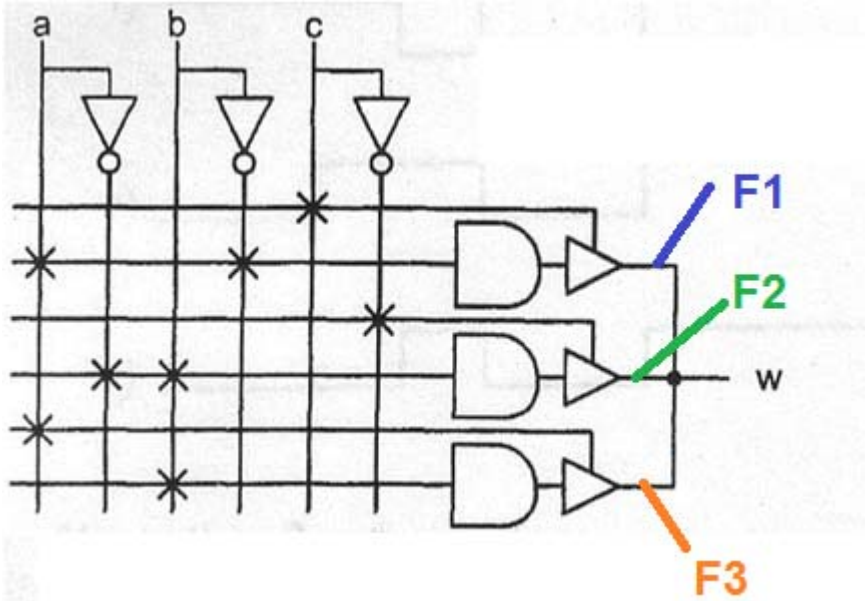
a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	1	0	1	1	1	1	1	1

4)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	0	0	0

3)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	1	x	1



$$F1 = a\bar{b}c$$

2)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	x	x	x

1)

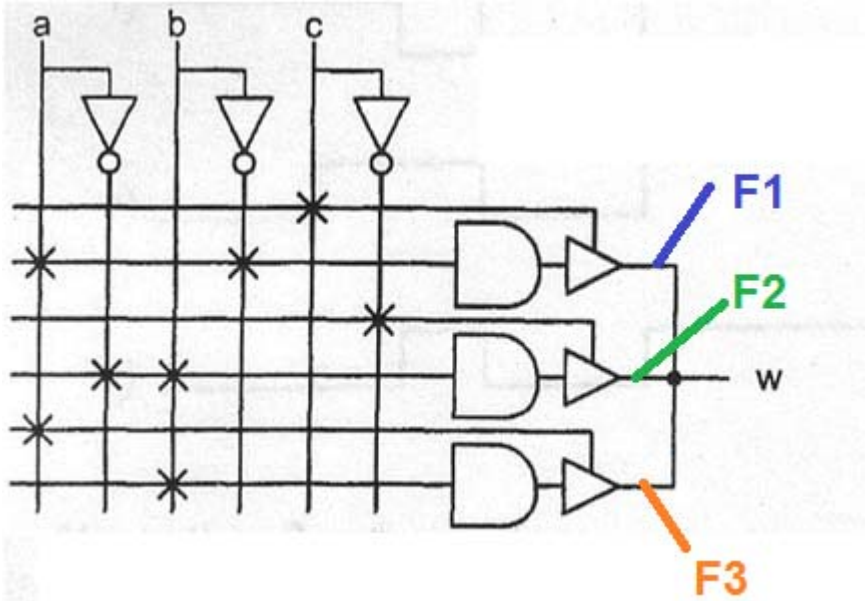
a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	1	0	1	1	1	1	1	1

4)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	0	0	0

3)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	1	x	1



$F1 = a\bar{b}c$ $F2 = \bar{a}b\bar{c}$

2)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	x	x	x

1)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	1	0	1	1	1	1	1	1

4)

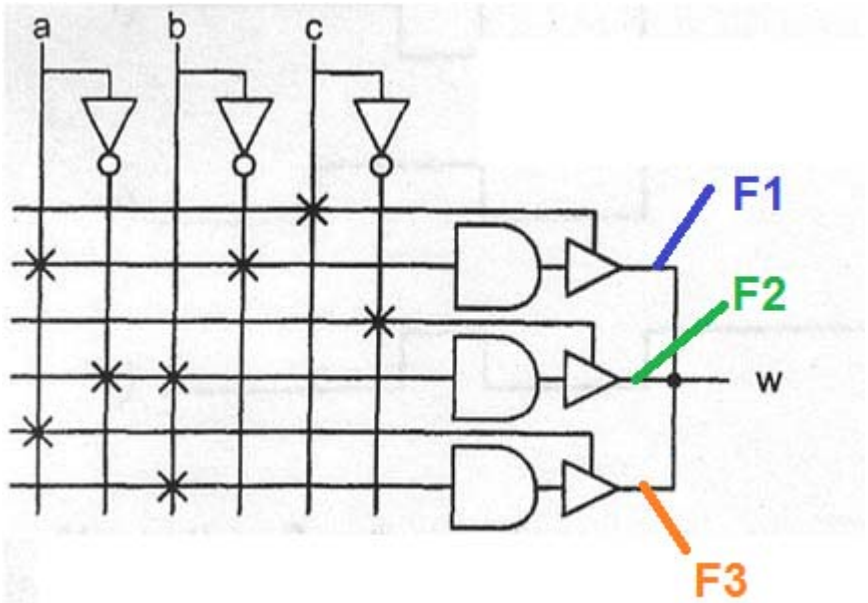
a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	0	0	0

3)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	1	x	1

$F1 = a\bar{b}c$ $F2 = \bar{a}b\bar{c}$

$F3 = ab$



2)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	x	x	x

1)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	1	0	1	1	1	1	1	1

4)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	0	0	0

3)

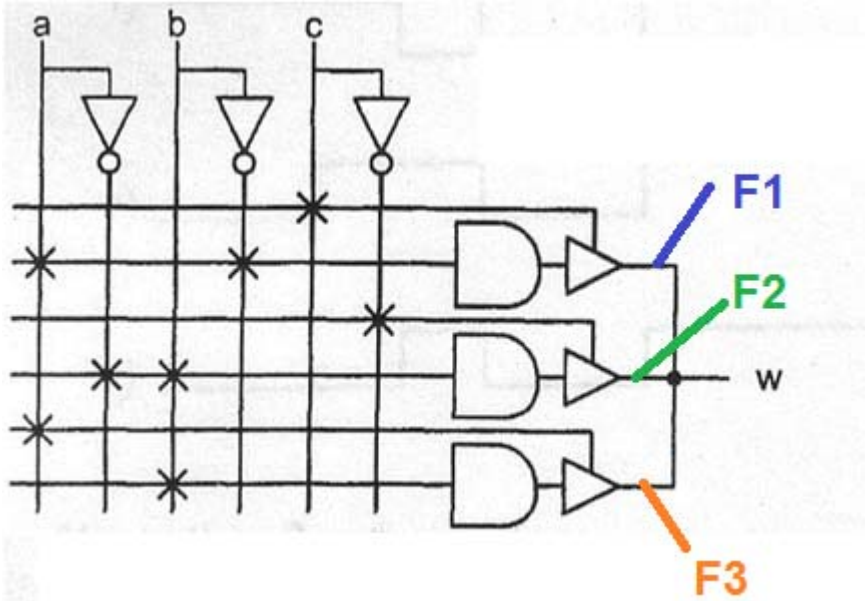
a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	1	x	1

$F1 = a\bar{b}c$

$F2 = \bar{a}b\bar{c}$

$F3 = ab$

$W = F1 + F2 + F3$



2)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	x	x	x

1)

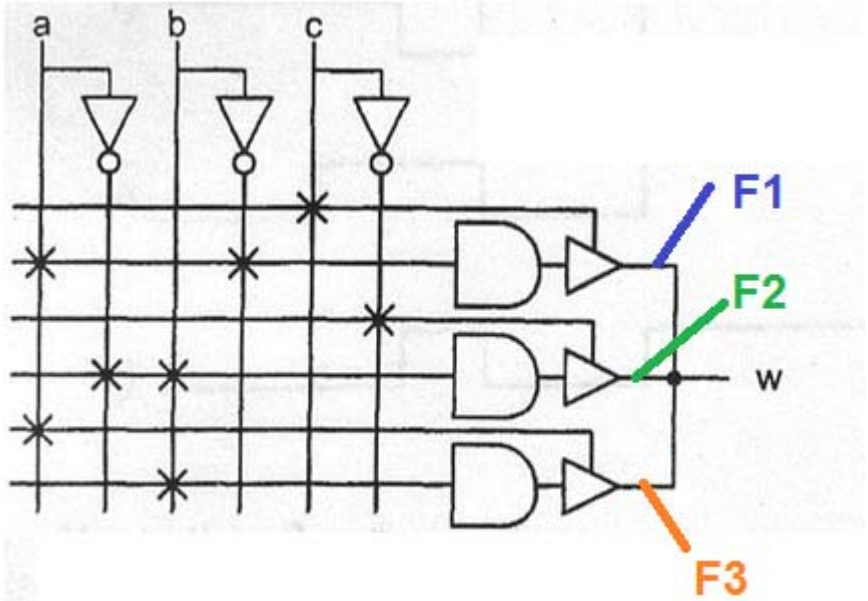
a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	1	0	1	1	1	1	1	1

4)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	0	0	0

3)

a	0	0	0	0	1	1	1	1
b	0	0	1	1	0	0	1	1
c	0	1	0	1	0	1	0	1
w	0	0	1	0	0	1	x	1



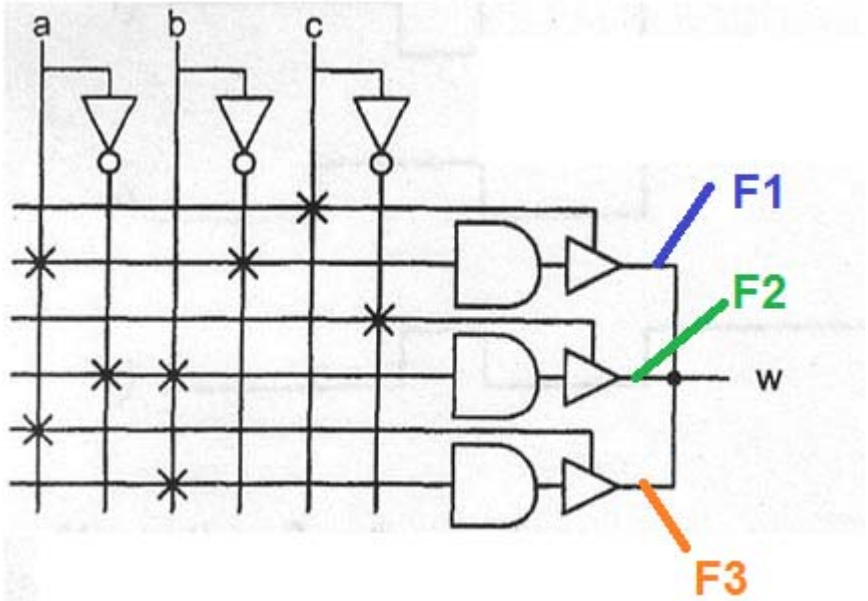
$F1 = a\bar{b}c$

$F2 = \bar{a}b\bar{c}$

$F3 = ab$

$W = F1 + F2 + F3$

a	b	c	F1	F2	F3	w
0	0	0				
0	0	1				
0	1	0				
0	1	1				
1	0	0				
1	0	1				
1	1	0				
1	1	1				



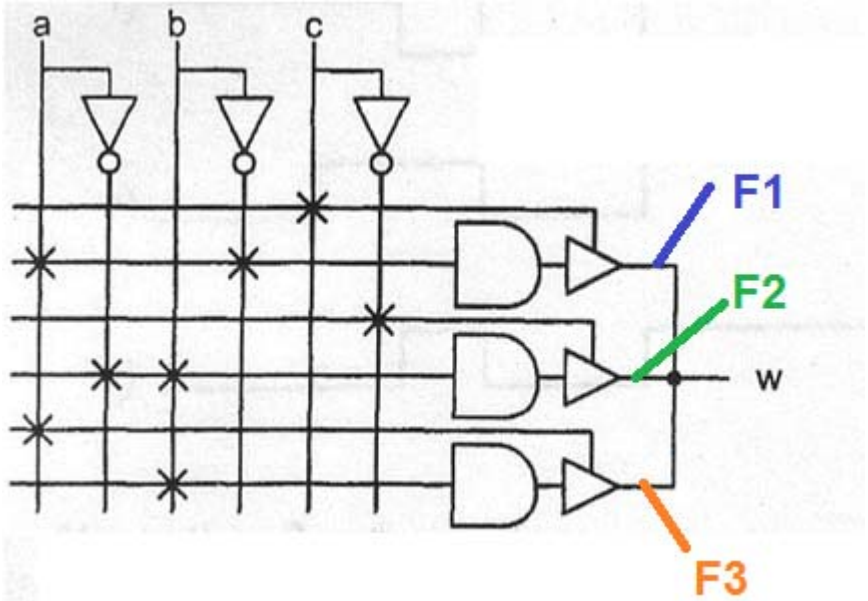
$F1 = a\bar{b}c$

$F2 = \bar{a}b\bar{c}$

$F3 = ab$

$W = F1 + F2 + F3$

a	b	c	F1	F2	F3	w
0	0	0	-			
0	0	1	0			
0	1	0	-			
0	1	1	0			
1	0	0	-			
1	0	1	1			
1	1	0	-			
1	1	1	0			



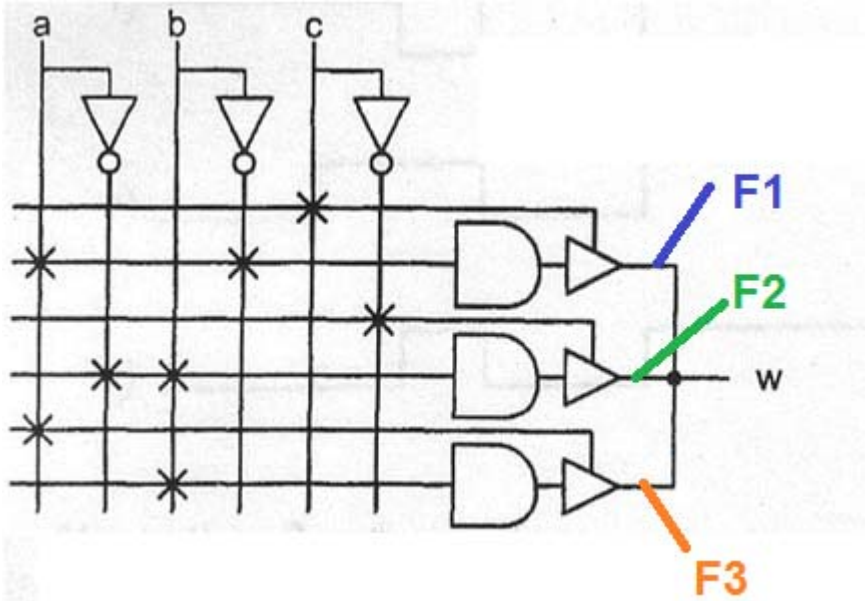
$F1 = a\bar{b}c$

$F2 = \bar{a}b\bar{c}$

$F3 = ab$

$W = F1 + F2 + F3$

a	b	c	F1	F2	F3	w
0	0	0	-	0		
0	0	1	0	-		
0	1	0	-	1		
0	1	1	0	-		
1	0	0	-	0		
1	0	1	1	-		
1	1	0	-	0		
1	1	1	0	-		



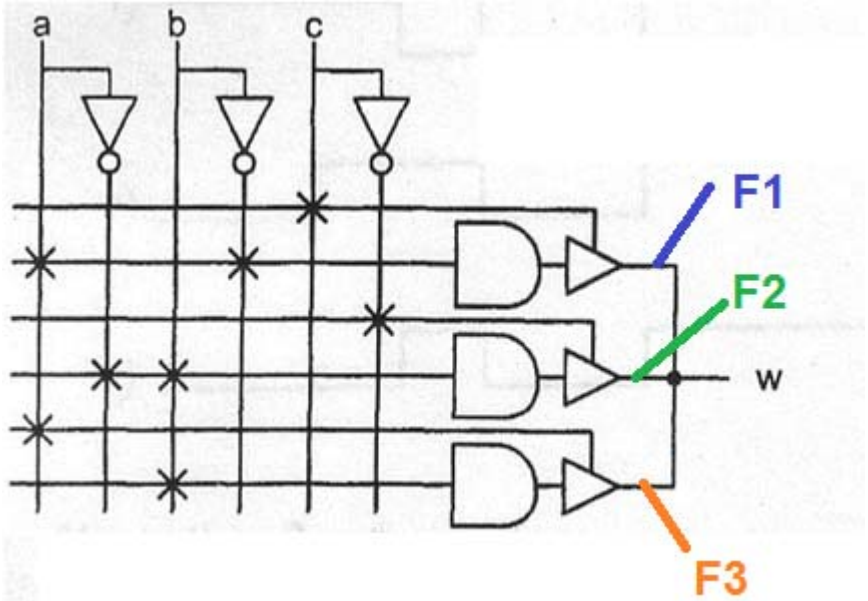
$F1 = a\bar{b}c$

$F2 = \bar{a}b\bar{c}$

$F3 = ab$

$W = F1 + F2 + F3$

a	b	c	F1	F2	F3	w
0	0	0	-	0	-	
0	0	1	0	-	-	
0	1	0	-	1	-	
0	1	1	0	-	-	
1	0	0	-	0	0	
1	0	1	1	-	0	
1	1	0	-	0	1	
1	1	1	0	-	1	



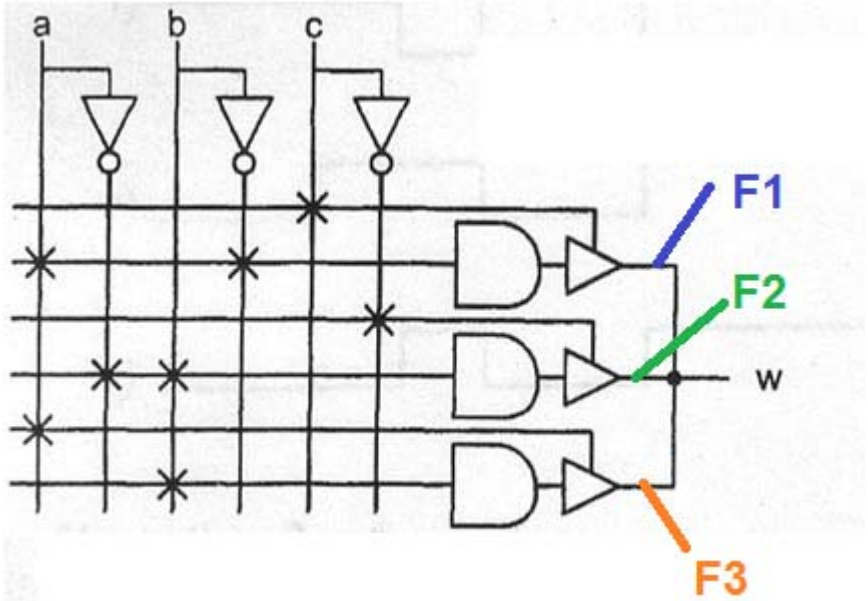
$F1 = a\bar{b}c$

$F2 = \bar{a}b\bar{c}$

$F3 = ab$

$W = F1 + F2 + F3$

a	b	c	F1	F2	F3	w
0	0	0	-	0	-	0
0	0	1	0	-	-	0
0	1	0	-	1	-	1
0	1	1	0	-	-	0
1	0	0	-	0	0	0
1	0	1	1	-	0	X
1	1	0	-	0	1	X
1	1	1	0	-	1	X



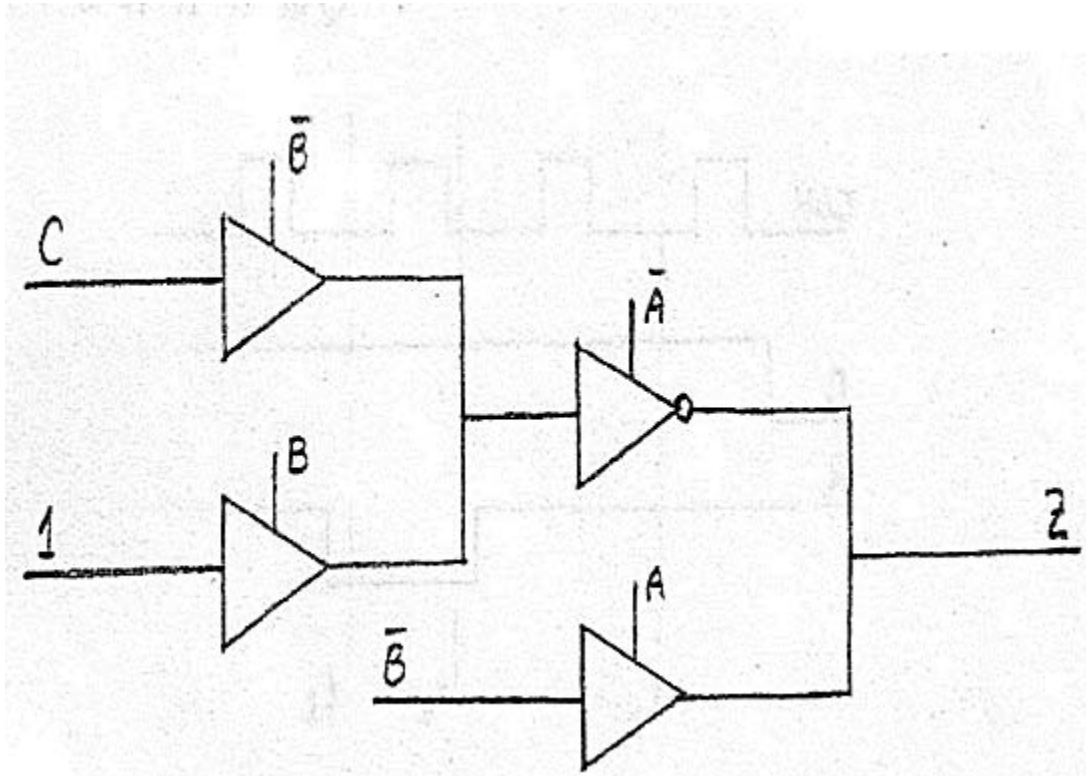
$F1 = a\bar{b}c$

$F2 = \bar{a}b\bar{c}$

$F3 = ab$

$W = F1 + F2 + F3$

a	b	c	F1	F2	F3	w
0	0	0	-	0	-	0
0	0	1	0	-	-	0
0	1	0	-	1	-	1
0	1	1	0	-	-	0
1	0	0	-	0	0	0
1	0	1	1	-	0	X
1	1	0	-	0	1	X
1	1	1	0	-	1	X



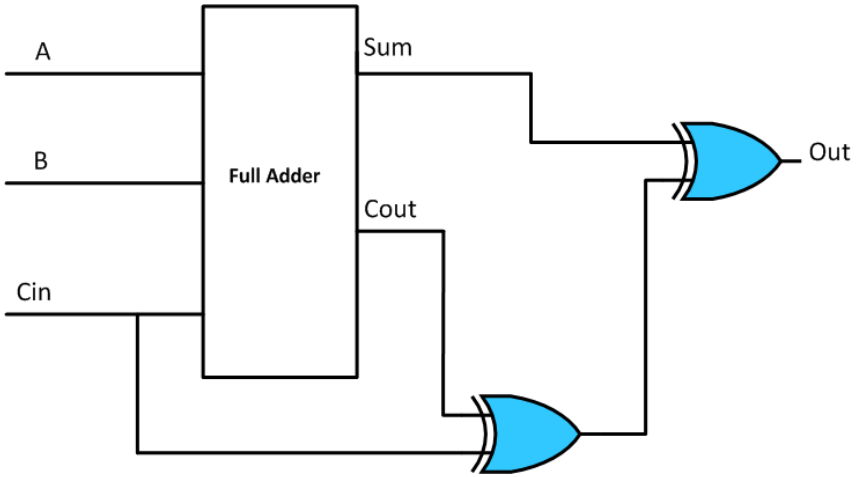
$z = 1$

$z = A + \bar{B}\bar{C}$

$z = \bar{A}B + BC$

$z = A\bar{B} + B\bar{C}$

If A = B then determine the output:



Out	
Cin	1
Sum	2
Cout	3
Sum’ Xor Cout	4

Thank You