

$$\text{AND} = AB$$

$$\text{OR} = A+B$$

$$\text{NOT} = \bar{A}, A'$$

$$\text{NAND} = \bar{AB}$$

$$\bar{AB} \neq \bar{A} \bar{B}$$

$$\bar{AB} = \bar{A} \text{ AND } \bar{B}$$

$$F(A, B) = AB'$$

input 1,0 give F=1

$$F(A, B) = A' + B$$

input A=0 or B=0 give F=1

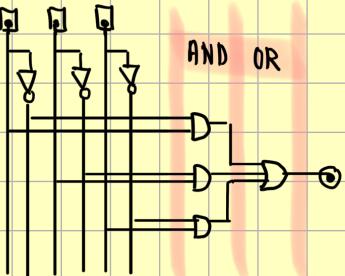
A	B	F
0	0	0
0	1	0
1	0	1
1	1	0

A	B	F
0	0	1
0	1	1
1	0	0
1	1	1

Sum of product (SOP) :

$$F(X, Y, Z) = X\bar{Y} + \bar{X}YZ + \bar{Y}Z + XZ \quad \text{"AND} \rightarrow \text{OR"}$$

SOP :



Product of sum (POS) :

$$F(X, Y, Z) = (X\bar{Y})(\bar{X}YZ)(\bar{Y}Z)(XZ) \quad \text{"OR} \rightarrow \text{AND"}$$

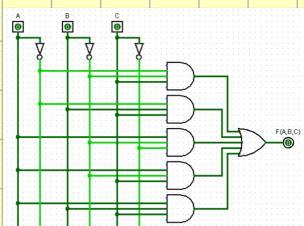
Activity 1

$$F(A, B, C) = \bar{A}\bar{B}C + \bar{A}BC + A\bar{B}\bar{C} + A\bar{B}C + ABC$$

(i) AND = 5

OR = 1

NOT = 3



* POS \Rightarrow need expand then only easier to fill in truth table

A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

(iii) Split out function to 2 groups

$$F(A, B, C) = A'B'C + A'BC + AB'C + AB'C + ABC$$

$$= A'(B'C + BC) + A(B'C + B'C + BC) \rightarrow \text{distributive OR}$$

$$= A'(C(B' + B)) + A(B'(C + C') + BC) \rightarrow \text{distributive OR}$$

$$= A'C + A(B' + BC) \rightarrow \text{inverse OR, identity AND}$$

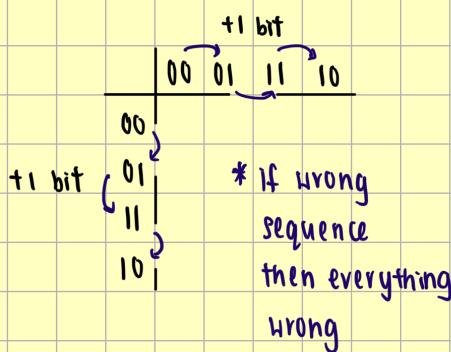
$$= A'C + A(B' + C) \rightarrow \text{absorption OR}$$

$$= A'C + AB' + AC \rightarrow \text{distributive OR}$$

$$= AB' + C(A + A) \rightarrow \text{distributive OR}$$

$$= AB' + C \rightarrow \text{inverse OR, identity AND}$$

GREY-CODE SEQUENCE :

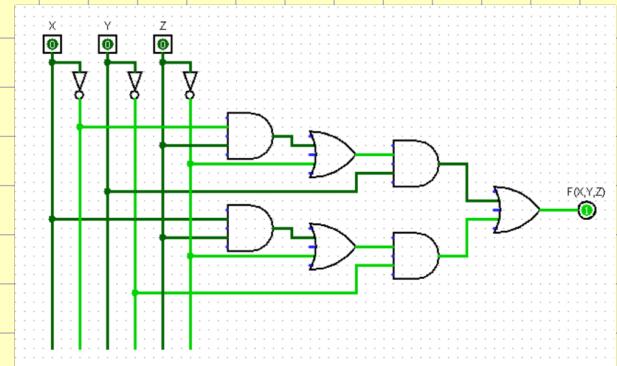
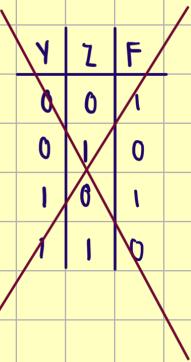


Activity 2

$$\begin{aligned}
 F(X,Y,Z) &= Y(\bar{X}Z + \bar{Z}) + \bar{Y}(XZ + \bar{Z}) \\
 &= Y\bar{X}Z + Y\bar{Z} + \bar{Y}XZ + \bar{Y}\bar{Z} \\
 &= Y\bar{X}Z + \bar{Y}XZ + Y\bar{Z} + \bar{Y}\bar{Z}
 \end{aligned}$$

(i)

X	Y	Z	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

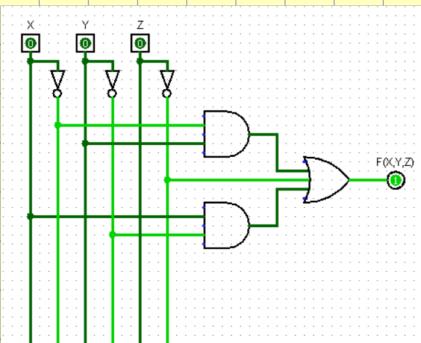


(iii)

YZ	$Y'Z'$	$Y'Z$	YZ	YZ'
X	00 01 11 10			
x'	0 1 0 1	1 0 1 1		
x	1 1 1 0	0 1 0 1		

$$F = Z' + X'Y + XY'$$

(iv)



Activity 3

A	B	C	D	Z
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	1

$$\begin{aligned}
 Z &= A'B'C'D' + A'B'C'D + A'B'CD' + A'BC'D' + \\
 &\quad A'BC'D + A'BCD + AB'CD' + ABCD
 \end{aligned}$$

(iii)

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

$$Z = A'C' + BC'D + B'C'D'$$