1. Construct a truth table for the following:
(x + y)(x + z)(x' + z)

Ans.

x	y	z	x + y	x + z	x' + z	(x + y)(x + z)(x' + z)
0	0	0	0	0	1	0
0	0	1	0	1	1	0
0	1	0	1	0	1	0
0	1	1	1	1	1	1
1	0	0	1	1	0	0
1	0	1	1	1	1	1
1	1	0	1	1	0	0
1	1	1	1	1	1	1

2. Show that *x = xy + xy '*
a. Using truth tables

b. Using Boolean identities

Ans.

a.

x	y	xy	xy'	xy + xy'
0	0	0	0	0
0	1	0	0	0
1	0	0	1	1
1	1	1	0	1

The final column is equal to x.

b. $xy + xy' = x(y + y') \quad$ *Distributive*
$= x(1) \quad$ *Inverse*
$= x \quad$ *Identity*

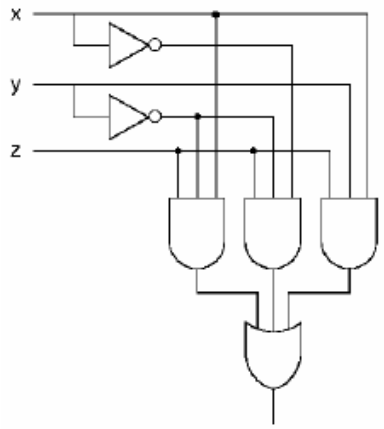
3. Given the function: F*(x,y,z)= xy'z + x'y'z + xyz*
a. List the truth table for F.
b. Draw the logic diagram using the original Boolean expression
c. Simplify the expression using Boolean algebra and identities.
d. List the truth table for your answer in Part c.
e. Draw the logic diagram for the simplified expression in Part c.

Ans.

a.

x	*y*	*z*	*xy'z*	*x'y'z*	*xyz*	*F*
0	0	0	0	0	0	0
0	0	1	0	1	0	1
0	1	0	0	0	0	0
0	1	1	0	0	0	0
1	0	0	0	0	0	0
1	0	1	1	0	0	1
1	1	0	0	0	0	0
1	1	1	0	0	1	1

b. Logic diagram for *xy'z + x'y'z + xyz*



c. *xy'z + x'y'z + xyz* = *(xy'z + xy'z) + x'y'z + xyz*
= *(xy'z + x'y'z) + (xy'z + xyz)*
= *(x + x')y'z + (y' + y)xz*
= *y'z + xz*

d.

x	*y*	*z*	*y'z*	*xz*	*F*
0	0	0	0	0	0
0	0	1	1	0	1
0	1	0	0	0	0
0	1	1	0	0	0
1	0	0	0	0	0
1	0	1	1	1	1
1	1	0	0	0	0
1	1	1	1	1	1

e. Logic diagram for $y'z + xz$: