

Design a combinational circuit that accepts a three bit number and generates an output binary number equal to the square of the input number.

Truth Table :

Inputs			Outputs					
X	Y	Z	a	b	c	d	e	f
0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1
0	1	0	0	0	0	1	0	0
0	1	1	0	0	1	0	0	1
1	0	0	0	1	0	0	0	0
1	0	1	0	1	1	0	0	1
1	1	0	1	0	0	1	0	0
1	1	1	1	1	0	0	0	1

We see that, the all output of e is equal to zero and the all output of f is equal to the input z. so we can write $e=0$ and $f=Z$. Now we draw the map for a, b, c, d.

MAP :

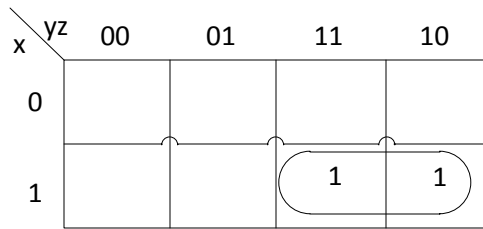


Fig: Map for a
 $a = xy$

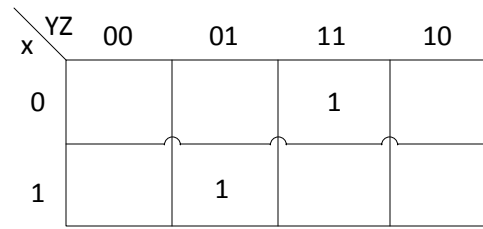


Fig: Map for c
 $C = xy'z + x'yz$
or
 $c = z(x \oplus y)$

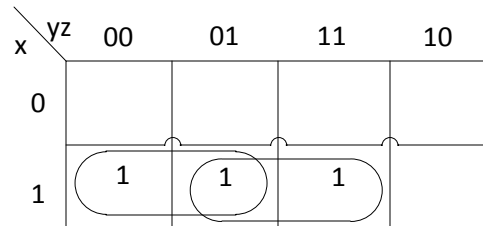


Fig: Map for b
 $b = xy' + xz$

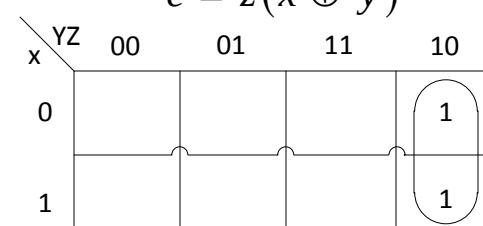


Fig: Map for d
 $d = yz'$

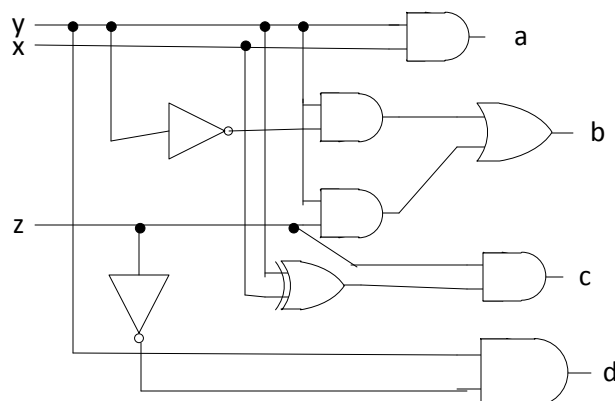


Fig: Circuit Diagram