

BCD (digital) display

A digital clock face is a grid of lights:

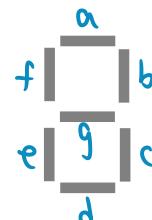


A clock face with all lights turned off



A clock face representing the number 7 with 3 lights turned on

So we can assign a variable to each light to control which turns on, in order to represent any number 0-9



Problem statement:

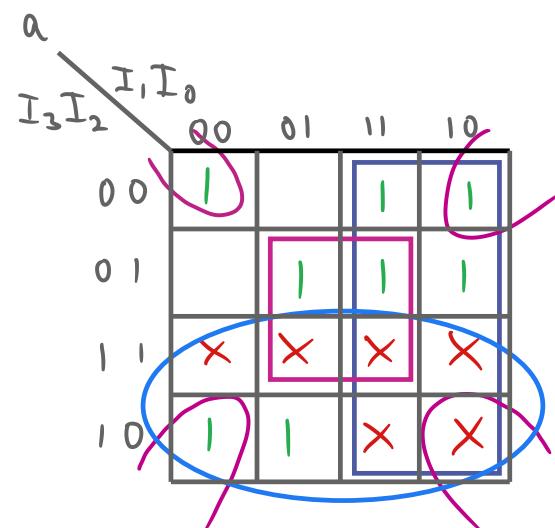
Find the simplified expression of a

$I_3 \ I_2 \ I_1 \ I_0$	Decimal number that we want to represent	$a \ b \ c \ d \ e \ f \ g$
0 0 0 0	0	1 1 1 1 1 1 0
0 0 0 1	1	0 1 1 0 0 0 0
0 0 1 0	2	1 1 0 1 1 0 1
0 0 1 1	3	1 1 1 1 0 0 1
0 1 0 0	4	0 1 1 0 0 1 1
0 1 0 1	5	1 0 1 1 0 1 1
0 1 1 0	6	1 0 1 1 1 1 1
0 1 1 1	7	1 1 1 0 0 0 0
1 0 0 0	8	1 1 1 1 1 1 1
1 0 0 1	9	1 1 1 0 0 1 1
1 0 1 0	X	X X X X X X X X
1 1 1 1	X	X X X X X X X X

We don't use these

Since we want the boolean expression expression that outputs a , we select the entire column of a and feed it to a k-map

To represent the number 0, we want to turn on all lights except for light g



$$I_2' I_0' + I_2 I_0 + I_3 + I_1$$

Simplified expression of a