

BCD (digital display)

A digital clock face is a grid of lights:

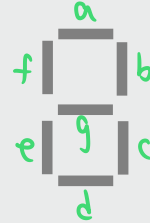


A clock face with all lights turned off



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
1	0	1	1	X	X	X	X	X	X	X	X

Since we want the boolean 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

a		$I_1 I_0$			
		00	01	11	10
$I_3 I_2$	00	1		1	1
	01		1	1	1
	11	X	X	X	X
	10	1	1	X	X

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

Simplified expression of a

we don't use these