

BCD (digital display)

A digital clock face is a grid of lights:



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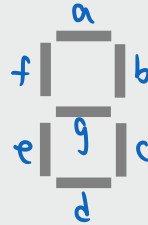
A clock face with all lights turned off



⇒

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

$I_3 I_2$	$I_1 I_0$	00	01	11	10
00	1		1	1	
01		1	1	1	1
11	x	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