

# BCD (digital display)

A digital clock face is a grid of lights:



⇒

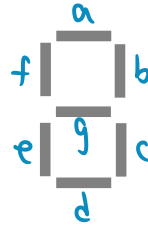
A clock face with all lights turned off



⇒

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



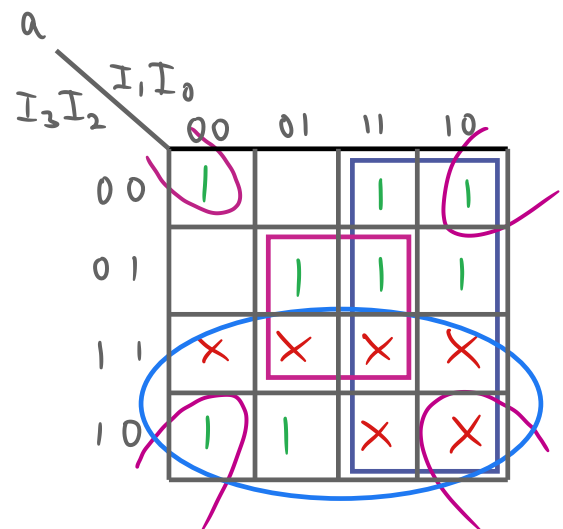
## Problem statement:

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  $g$



$$I_2'I_0' + I_2I_0 + I_3 + I_1$$

↳ Simplified expression of  $a$

we don't use these