

# BCD (digital display)

Following the example covered in class, get the simplified of  $a$



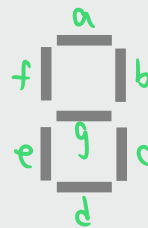
$\Rightarrow$  A clock face with all lights turned off

A digital clock face is a grid of lights:



$\Rightarrow$  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 to represent any number 0-9



$I_3$	$I_2$	$I_1$	$I_0$	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

$\rightarrow$  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	
11	X	X	X	X	X
10	1	1	X	X	

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

$\hookrightarrow$  simplified expression of  $a$

we don't use these