BCD (digital display)

A digital clock face is a grid of lights:
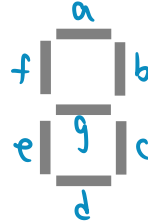

⟹ } A clock face with all lights turned off

⟹ } 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
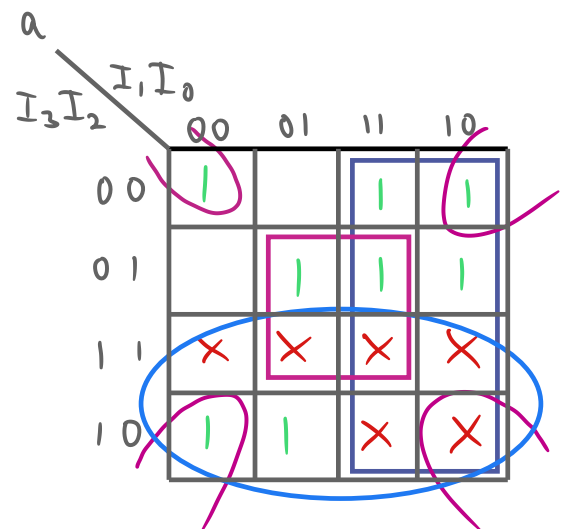

Problem statement:

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 1 1 1	X	X X X X X X X

} Don't Cares

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