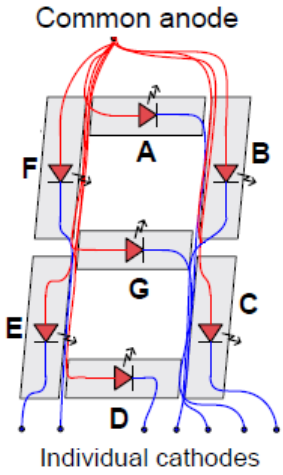
Problem 1

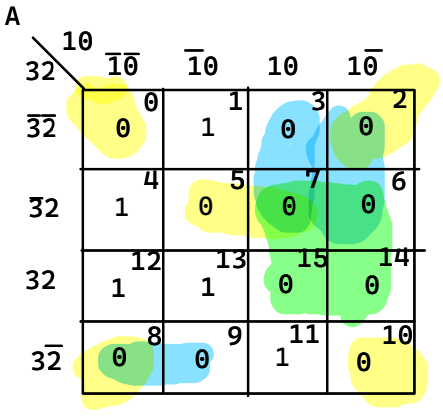
I3	I2	I1	I0	A	B	C	D	E	F	G
0	0	0	0	0	0	0	0	0	0	1
0	0	0	1	1	0	0	1	1	1	1
0	0	1	0	0	1	0	0	1	0	0
0	0	1	1	0	0	0	0	1	1	0
0	1	0	0	1	0	0	1	1	0	0
0	1	0	1	0	1	0	0	1	0	0
0	1	1	0	0	1	0	0	0	0	0
0	1	1	1	0	0	0	1	1	1	1
1	0	0	0	0	0	0	0	0	0	0
1	0	0	1	0	0	0	1	1	0	0
1	0	1	0	0	0	0	1	0	0	0
1	0	1	1	1	1	0	0	0	0	0
1	1	0	0	1	1	1	0	0	1	0
1	1	0	1	1	0	0	0	0	1	0
1	1	1	0	0	1	1	0	0	0	0
1	1	1	1	0	1	1	1	0	0	0



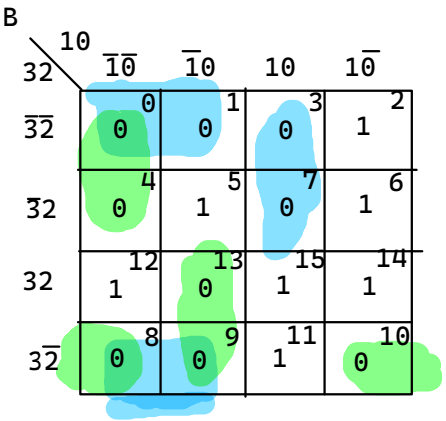
1. Fill the truth table for an active low seven segment decoder **Hint:** we will use lower case letters for 11, 12, 13 and upper case letters for 10, 14, and 15.
2. Using four variable K-maps find the most simplified minterms expressions for LEDs A to D.
3. Using four variable K-maps find the most simplified maxterms expressions for LEDs E to G.

Problem 2

1. Repeat problem 1 assuming BCD input which limits the digits between 0 and 9 and the rest are don't care.
2. Comment on how much the "don't care" inputs helped you to reduce your expressions.

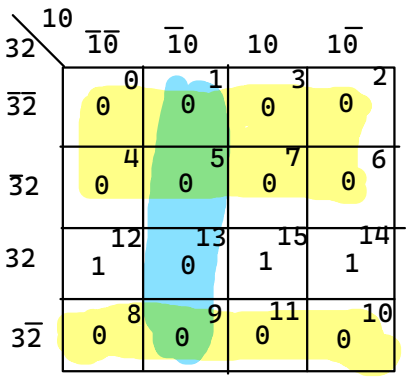


$o=\overline{2}\overline{0}+21+32\overline{1}+\overline{3}20+\overline{3}1$



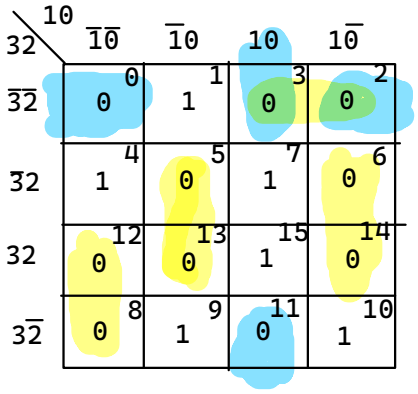
$o=\overline{2}1+3\overline{2}\overline{0}+3\overline{1}0+\overline{3}\overline{1}\overline{0}+\overline{3}10$

C



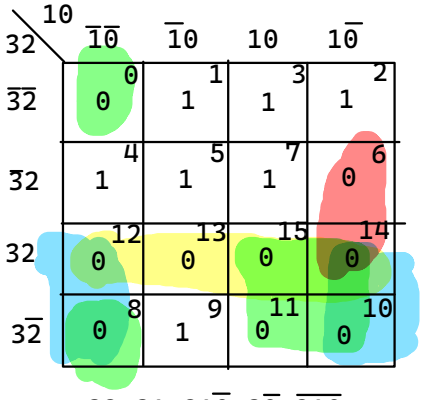
$o=\overline{3}+3\overline{2}+\overline{1}0$

D



$o=2\overline{1}0+21\overline{0}+\overline{3}\overline{2}1+\overline{3}\overline{2}0+\overline{2}10+\overline{3}10$

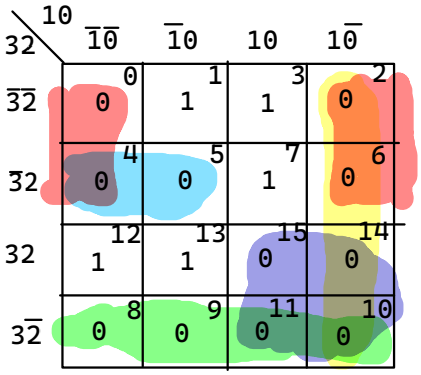
E



$o=32+31+21\overline{0}+3\overline{0}+\overline{2}\overline{1}0$

$\overline{o}=(\overline{3}+\overline{2})(\overline{3}+\overline{1})(\overline{2}+\overline{1}+0)(\overline{3}+0)(2+1+0)$

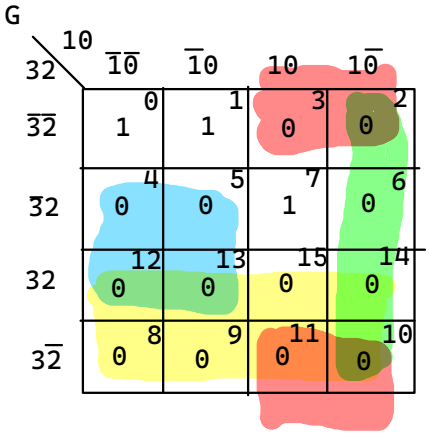
F



$o=\overline{3}\overline{0}+\overline{3}2\overline{1}+1\overline{0}+31+3\overline{2}$

$\overline{o}=(3+0)(3+\overline{2}+1)(\overline{1}+0)(\overline{3}+\overline{1})(\overline{3}+2)$

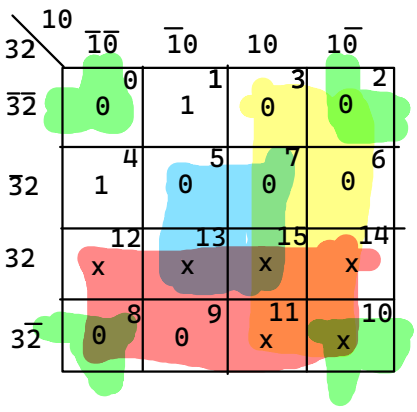
G



$o=\overline{2}1+1\overline{0}+2\overline{1}+3$

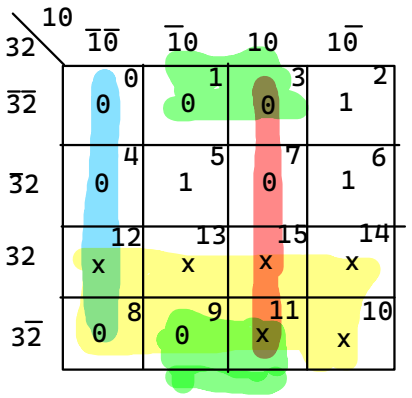
$o=(2+\overline{1})(\overline{1}+0)(\overline{2}+1)(\overline{3})$

A



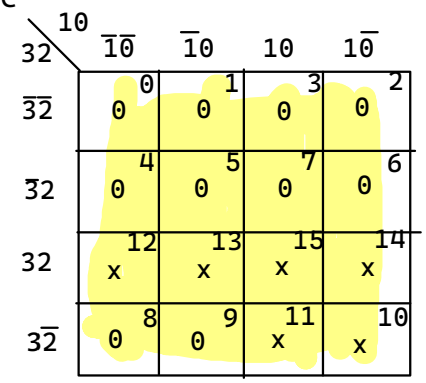
$o=3+1+20+\overline{20}$

B



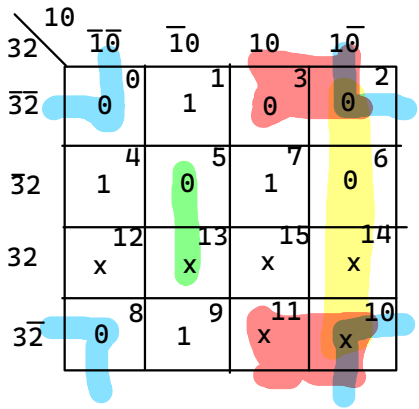
$o=3+10+\overline{10}+\overline{20}$

C



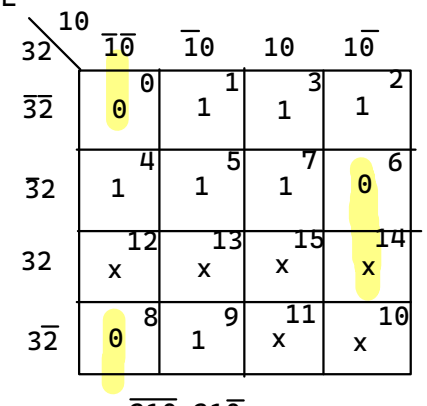
o= "0"

D



$o=\overline{20}+\overline{21}+2\overline{10}+1\overline{0}$

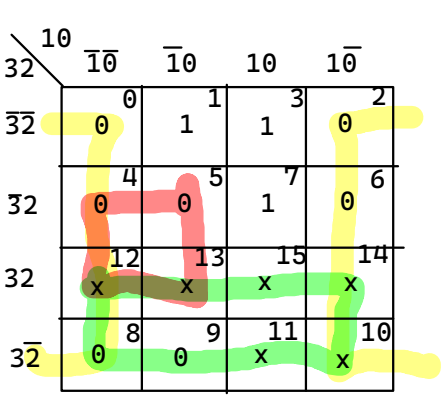
E



$o=\overline{21}\overline{0}+21\overline{0}$

$\overline{o}=(2+1+0)(\overline{2}+\overline{1}+0)$

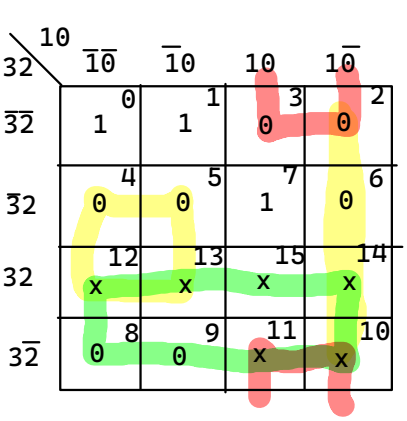
F



$o=3+\overline{0}+2\overline{1}$

$\overline{o}=(\overline{3})(0)(\overline{2}+1)$

G



$o=3+\overline{21}+2\overline{1}+1\overline{0}$

$o=(\overline{3})(2+\overline{1})(\overline{2}+1)(\overline{1}+0)$