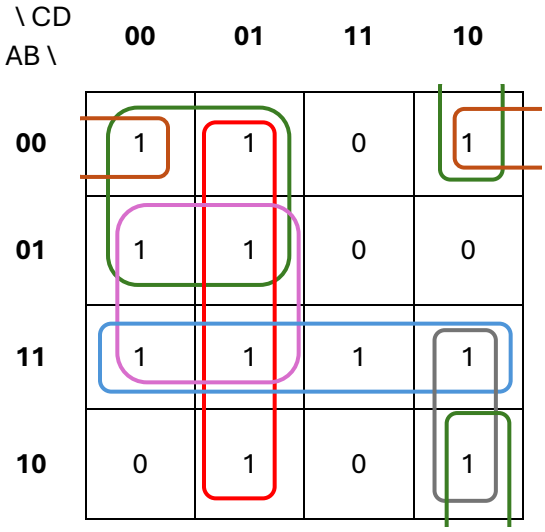
a) Using the truth table below, create a K-map and solve for a minimal sum-of-products expression.

A	B	C	D	Y
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

Here is a grid you can use if desired.



Essential prime implicants: $A \cdot B,\ \ \overline{C} \cdot D$

Minimal SoP: $Y = A \cdot B + \overline{C} \cdot D + \overline{A} \cdot \overline{C} + \overline{B} \cdot C \cdot \overline{D}$
(this is the *only* correct minimal SoP)

b) Regardless of whether or not you circled them in the K-map or used them in the SoP expression, are there any **non-essential prime implicants** (of 1s) in this function? If so, what are the expressions that represent them?

Non-essential prime implicants: $\overline{A} \cdot \overline{C},\ \ B \cdot \overline{C},\ \ A \cdot C \cdot \overline{D},\ \ \overline{B} \cdot C \cdot \overline{D},\ \ \overline{A} \cdot \overline{B} \cdot \overline{D}$