

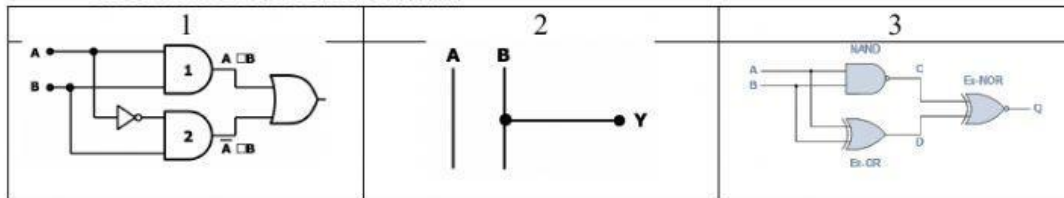
Watch the video in the link [K-Map](#) then answer the questions.

Part 1) a. what is the simplest form for the Boolean expression below? Re-write the expression in the shortest form.

$$Y = \bar{A}B + AB$$

b. What is the simplest circuit for the expression in a?

Insert the circuit number



Part 2) Simplification using K-Map.

a. Draw the truth table for the following Boolean expression.

$$Y = A\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}\bar{B}C$$

| A | B | C | Y | Sum of products (SOP) |
|---|---|---|---|-----------------------|
| 0 | | | 1 | $A*B*C^*$ |
| 0 | | | | |
| 0 | | | | $A*BC^*$ |
| 0 | | | | |
| 1 | | | | $AB*C^*$ |
| 1 | | | 0 | |
| 1 | | | 0 | |
| 1 | | | | |

b. Watch the video in the link [K-Map](#) then answer the questions.

i) How many variables we have in the expression?

ii) What is the size of the K-Map? 2 or 8 or 16 entries?

c. Complete the correct K-Map template with correct entries from the truth table.

| A \ B | 0 | 1 |
|-------|---|---|
| 0 | | |
| 1 | | |

| A \ BC | 00 | 01 | 11 | 10 |
|--------|----|----|----|----|
| 0 | | | | |
| 1 | | | | |

| AB \ CD | 00 | 01 | 11 | 10 |
|---------|----|----|----|----|
| 00 | | | | |
| 01 | | | | |
| 11 | | | | |
| 10 | | | | |

d. Mark the SOP groups in the K-map.

e. After using K-Map, what is the simplest form of the expression in a?

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- f. What is the Boolean expression for the following K-Map?

| CD AB | 00 | 01 | 11 | 10 |
|----------|----|----|----|----|
| 00 | 0 | 1 | 1 | 0 |
| 01 | 0 | 1 | 0 | 0 |
| 11 | 0 | 1 | 0 | 0 |
| 10 | 1 | 1 | 1 | 1 |

Y=

Part 3) Application

A bank wants to install an alarm system with movement sensors. The bank have three sensors (A,B,C). To prevent false alarms produced by a single sensor activation, the alarm will be triggered only when at least two sensors activate simultaneously.

Step 1 complete the Truth table

| A | B | C | Y |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Step 2 Fill in the K- Map with entries from truth table

| BC A | 00 | 01 | 11 | 10 |
|---------|----|----|----|----|
| 0 | | | | |
| 1 | | | | |

Step 3 Group the SOP terms in the K-Map then find the simplest Boolean expression.

Y=