

Minimization of the Boolean Function

Given the K-map with variables x, y, z :

$x \backslash yz$	00	01	11	10
0	1	1	1	0
1	0	0	1	0

where the entries with 1 correspond to the minterms:

$$m_0, m_1, m_3, m_7$$

Step 1: Write the canonical sum of products

$$f = m_0 + m_1 + m_3 + m_7 = x'y'z' + x'y'z + x'yz + xyz$$

Step 2: Group terms from the K-map

From the K-map, group the first three 1's in the top row:

$$x'(y'z' + y'z + yz) = x'(y' + yz)$$

Using Boolean algebra, simplify inside the parentheses:

$$y' + yz = y' + z$$

Thus,

$$f = x'(y' + z) + xyz$$

Step 3: Expand the expression

$$f = x'y' + x'z + xyz$$

Step 4: Check for further simplification

Using the consensus theorem, the term $x'z$ is redundant because it is the consensus of $x'y'$ and yz . Hence, we can write:

$$f = x'y' + yz$$

Final simplified expression:

$$\boxed{f = x'y' + yz}$$