

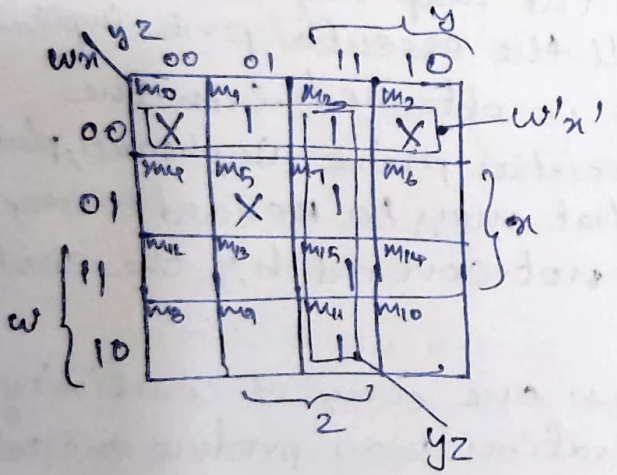
• Don't-Care conditions (Don't care Map Entries)

- In some applications, the function is not specified for certain combination of the variables
- As an example, the four-bit binary code for the decimal digits has 512 combinations that are not used and consequently are considered to be unspecified.
- Functions that have unspecified outputs for some input combinations are called incompletely specified functions.
- In most applications, we simply, don't care what value is assumed by the function for the unspecified minterms.

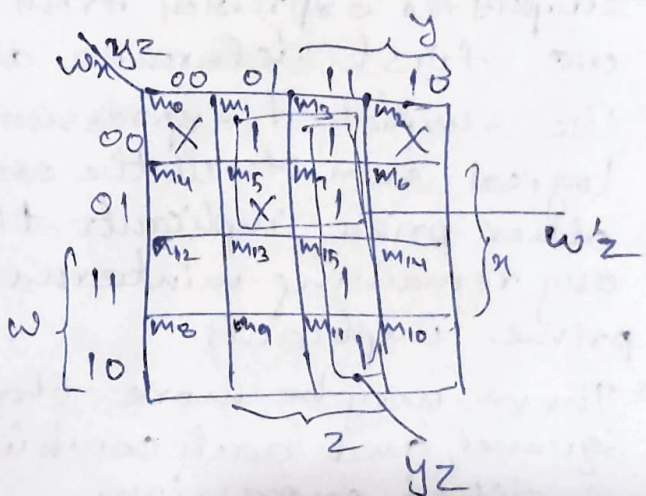
- A don't-care minterm is a combination of variables whose logical value is not specified.
- Such a minterm cannot be marked with a 1 in the map, because it would require that the function always be a 1.
- Likewise, putting a 0 on the square requires the function to be 0.
- To distinguish the don't-care condition from 1's and 0's, an X is used.

→ In choosing adjacent squares to simplify the function in a map, don't-care minterms may be assumed to be either 0 or 1, depending on which combination gives the simplest expression.

Q → Simplify the Boolean function $F(w, x, y, z) = \sum(1, 3, 7, 11, 15)$ which has the don't-care conditions $d(w, x, y, z) = \sum(0, 2, 5)$



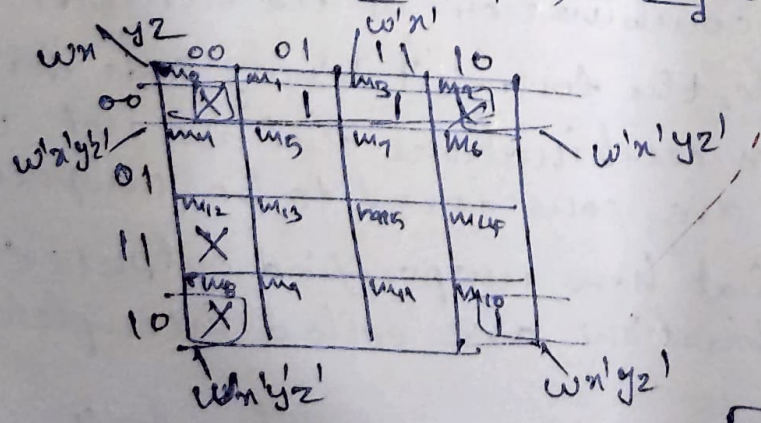
$$F = yz + w'n'$$



$$F = yz + w'z$$

Q → Simplify the Boolean function

$$F(w, x, y, z) = \sum(1, 3, 10) + \sum_d(0, 2, 8, 12)$$



$$\begin{aligned} w'n'y'z' + w'n'y'z &= w'n'z' \\ w'n'y'z + w'n'y'z &= w'n'z \\ w'n'z' + w'n'z &= n'z \end{aligned}$$

$$F = w'n' + n'z$$