#1: An example of gate sharing is given below Two functions, f1 and f2, of the same variables are to be implemented. The minimum-cost implementations for these functions are obtained as shown in parts (a) and (b) of the figure. This results in the expressions

$$f_1 = x_1\bar{x}_3 + \bar{x}_1 x_3 + x_2\bar{x}_3 x_4$$
$$f_2 = x_1\bar{x}_3 + \bar{x}_1 x_3 + x_2 x_3 x_4$$

The cost of f1 is four gates and 10 inputs, for a total of 14. The cost of f2 is the same. Thus the total cost is 28 if both functions are implemented by separate circuits. A less-expensive realization is possible if the two circuits are combined into a single circuit with two outputs. Because the first two product terms are identical in both expressions,

DRAW the combined circuit with two outputs.
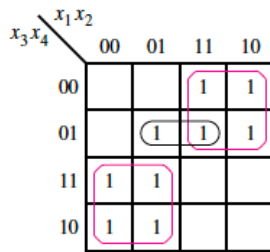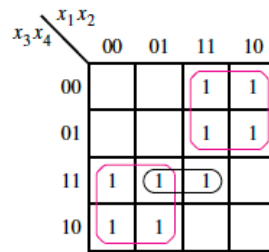
(a) Function f_1 (b) Function f_2

SOLUTION

#2: For the following function $F(x, y, z) = \sum m (1, 2, 3, 5, 7)$

- Draw the Karnaugh map for the above function
- Find the optimal SOP equation for the above function.
- Draw the logic circuit for the above function.

SOLUTION

#3 Simplify $F(w, x, y, z) = \sum m (0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$

- Draw the Karnaugh map for the above function
- Write the algebraic equation from the Karnaugh map

SOLUTION