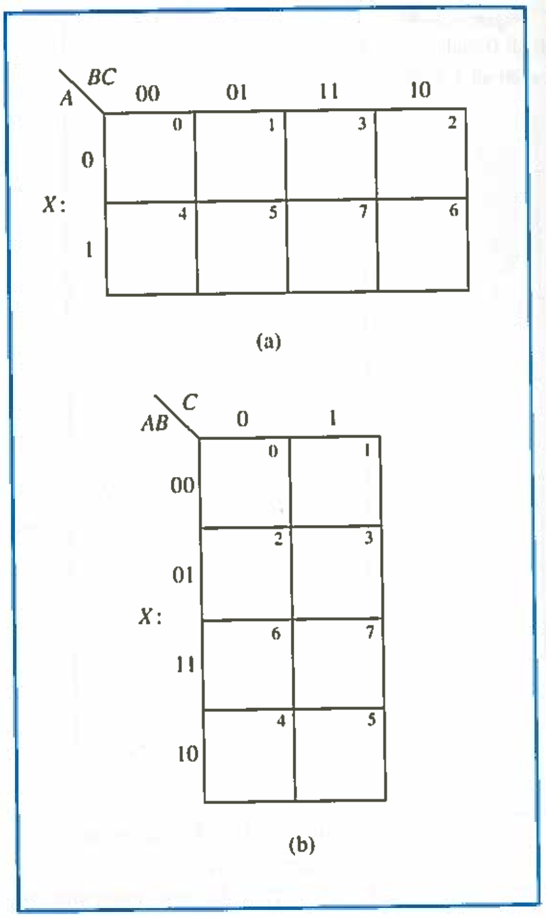
Figure 3–49
Two different configurations of a three-variable K-map.



cells that are diagonally opposite each other are not adjacent since more than one variable changes in going from one cell to another. Thus, cells nos. 4 and 1 are *not* adjacent, cells nos. 5 and 3 are *not* adjacent, etc.

Because of the manner in which the cells in a three-variable K-map are numbered, care must be taken when filling in the values of the dependent variable into each cell in going from a truth table to a K-map. Figure 3–50 shows a three-variable truth table and its three-variable K-map representations. Notice that the values in each cell of the K-map are the values of the dependent variable Z, and the "coordinates" of each cell are the values of the independent variables P, Q, and R.

As stated earlier, there are two methods used to obtain a simplified equation from a K-map—combining cells containing 1's into adjacent groups to obtain a simplified sum-of-products equation, and combining cells containing 0's into adjacent groups to obtain a simplified product-of-sums equation. We will examine the first method now and then apply the concepts to the second method at the end of this section.

As stated earlier, if a K-map has nonadjacent cells containing 1's, then no simplification is possible. Figure 3–51 illustrates such a K-map. In cases such as this the logic equation is simply the sum of the minterms for each cell

$$P = \bar{A}\bar{B}\bar{C} + \bar{A}BC + A\bar{B}C$$