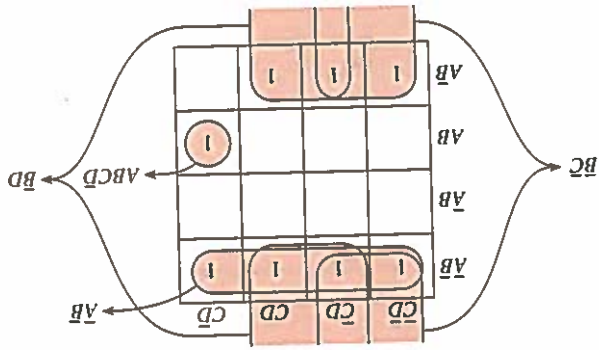


Simplify the following equation using the Karnaugh mapping procedure:

### EXAMPLE 5-28

Figure 5-73 Solution to Example 5-27.



$$X = \overline{A}B + \overline{B}C + \overline{C}D + \overline{D}A$$

The last 1 is not adjacent to any other, so it must be encircled by itself to form  $\overline{A}B\overline{C}D$ . The final simplified equation is

as shown, to form  $\overline{A}B$ . The group of four 1's can be combined within a group of four, unattached 1 in the bottom row can be combined with any others. The form  $\overline{B}C$ . That leaves two 1's that are not combined with any others. The group of four 1's can be encircled to form  $\overline{A}B$ , as shown in Figure 5-73. Another group of four can be encircled using wraparound to form  $\overline{B}C$ . That leaves two 1's that are not combined with any others. The

$$X = \overline{A}B + \overline{B}C + \overline{C}D + \overline{D}A$$

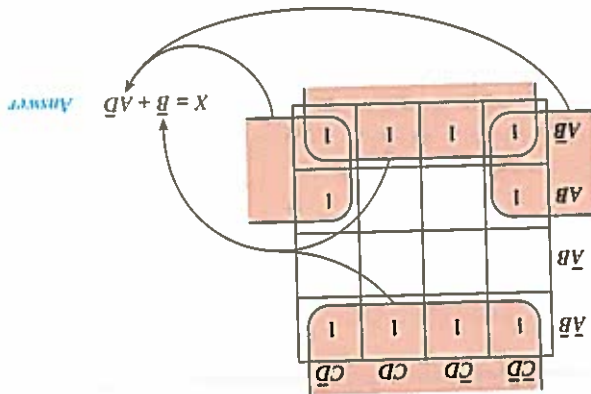
**Solution:** Before filling in the K-map, an SOP expression must be formed:

$$X = \overline{B}(CD + \overline{C}) + \overline{C}(A + B + \overline{A}B)$$

Simplify the following equation using the Karnaugh mapping procedure:

### EXAMPLE 5-27

Figure 5-72 Solution to Example 5-26 illustrating the wraparound feature.



$$X = \overline{B} + \overline{A}D$$

Students often neglect to include the single encirclement (4-variable) term in the final equation.

