3. Find all possible Hamilton circuits in the given graph.
   (Use A as your reference point.)

   (a) Figure 6-22(a)

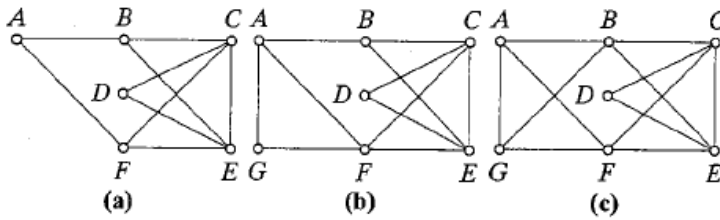   (b) Figure 6-22(b)

   (c) Figure 6-22(c)

FIGURE 6-22

11. For the graph shown in Fig. 6-30,

   (a) find a Hamilton path that starts at A and ends at D.

   (b) find a Hamilton path that starts at G and ends at H.

   (c) explain why the graph has no Hamilton path that starts at B.

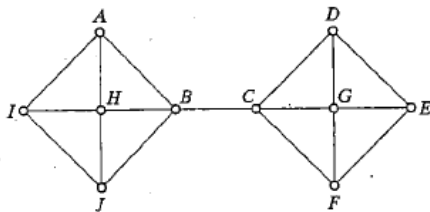   (d) explain why the graph has no Hamilton circuit.

FIGURE 6-30

16. For the weighted graph shown in Fig. 6-35,

(a) find a Hamilton path that starts at B and ends at D, and give its weight.

(b) find a second Hamilton path that starts at B and ends at D, and give its weight.

(c) find the optimal (least weight) Hamilton path that starts at B and ends at D, and give its weight.
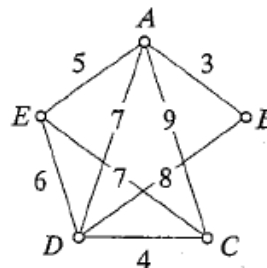

FIGURE 6-35

For Exercises 21 through 24, you will need a calculator with a factorial key. (Any scientific or graphing calculator should do.)

21. Using a calculator with a factorial key,

(a) compute 20!.

(b) compute 22!.

(c) compute the number of Hamilton circuits in K_{21}.

25. (a) How many edges are there in K_{20}?

(b) How many edges are there in K_{21}?

(c) If the number of edges in K_{50} is x, and the number of edges in K_{51} is y, what is the value of $y - x$?

29. For the weighted graph shown in Fig. 6-36, (i) find the indicated tour, and (ii) give its cost.

(a) An optimal tour (use the brute-force algorithm)

(b) The nearest-neighbor tour with starting vertex A

(c) The nearest-neighbor tour with starting vertex B

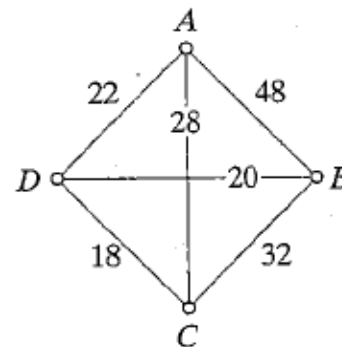**(d)** The nearest-neighbor tour with starting vertex C

FIGURE 6-36

35. Darren is a sales rep whose territory consists of the six cities in the mileage chart shown in Fig. 6-42. Darren wants to visit customers at each of the cities, starting and ending his trip in his home city of Atlanta. His travel costs (gas, insurance, etc.) average $0.75 per mile.

(a) Find the nearest-neighbor tour with Atlanta as the starting city. What is the total cost of this tour?

(b) Find the nearest-neighbor tour using Kansas City as the starting city. Write the tour as it would be traveled by Darren, who must start and end the trip in Atlanta. What is the total cost of this tour?

Mileage Chart

	Atlanta	Columbus	Kansas City	Minneapolis	Pierre	Tulsa
Atlanta	*	533	798	1068	1361	772
Columbus	533	*	656	713	1071	802
Kansas City	798	656	*	447	592	248
Minneapolis	1068	713	447	*	394	695
Pierre	1361	1071	592	394	*	760
Tulsa	772	802	248	695	760	*

D Repetitive Nearest-Neighbor Algorithm

37. For the weighted graph shown in Fig. 6-44, find the repetitive nearest-neighbor tour. Write the tour using B as the starting vertex.
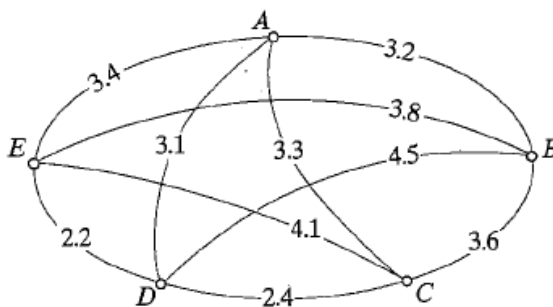

FIGURE 6-44

E Cheapest-Link Algorithm

43. For the weighted graph shown in Fig. 6-46, find the cheapest-link tour. Write the tour using B as the starting vertex. (*Note:* This is the graph in Exercise 37.)
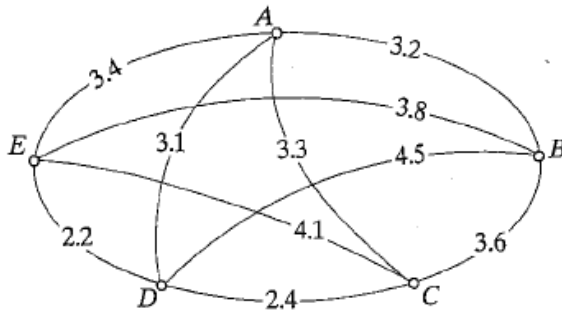

FIGURE 6-46

59. The graph shown in Fig. 6-50 is called the *dodecahedral graph*, because it describes the relationship between the vertices and edges of a *dodecahedron*, a regular three-dimensional solid consisting of 12 faces, all of which are regular pentagons. Find a Hamilton circuit in the graph. Indicate your answer by labeling the vertices in the order of travel.
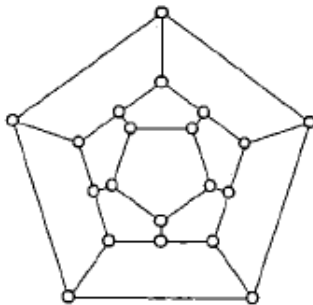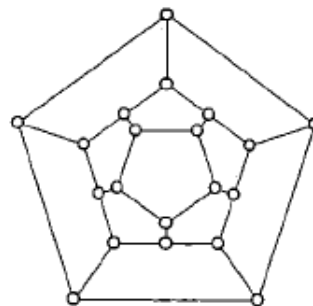

FIGURE 6-50   **FIGURE 6-50**

Exercises 71 and 72 refer to the following situation. Nick is a traveling salesman. His territory consists of the 11 cities shown on the mileage chart in Fig. 6-55. Nick must organize a round trip that starts and ends in Dallas (that's his home) and visits each of the other 10 cities exactly once.

71. Working directly from the mileage chart, find a nearest-neighbor tour that starts at Dallas. Explain the procedure you used to find the answer.

72. Working directly from the mileage chart, find the a cheapest-link tour. Explain the procedure you used to find the answer.

Mileage Chart

	Atlanta	Boston	Buffalo	Chicago	Columbus	Dallas	Denver	Houston	Kansas City	Louisville	Memphis
Atlanta	*	1037	859	674	533	795	1398	789	798	382	371
Boston	1037	*	446	963	735	1748	1949	1804	1391	941	1293
Buffalo	859	446	*	522	326	1346	1508	1460	966	532	899
Chicago	674	963	522	*	308	917	996	1067	499	292	530
Columbus	533	735	326	308	*	1028	1229	1137	656	209	576
Dallas	795	1748	1346	917	1028	*	781	243	489	819	452
Denver	1398	1949	1508	996	1229	781	*	1019	600	1120	1040
Houston	789	1804	1460	1067	1137	243	1019	*	710	928	561
Kansas City	798	1391	966	499	656	489	600	710	*	520	451
Louisville	382	941	532	292	209	819	1120	928	520	*	367
Memphis	371	1293	899	530	576	452	1040	561	451	367	*

FIGURE 6-55