MGF1107
Unit 4 - STUDY GUIDE
Mr. Foley

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Create a graph with the given properties.

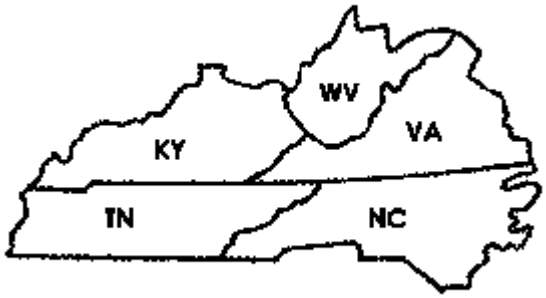
1) Six odd vertices 1) _____

2) Three even and two odd vertices 2) _____

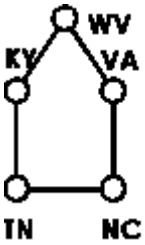
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Represent the following with a graph.

3) 3) _____



A)



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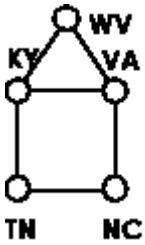

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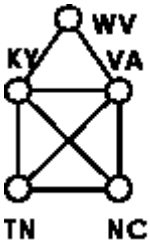
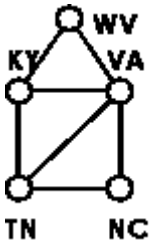
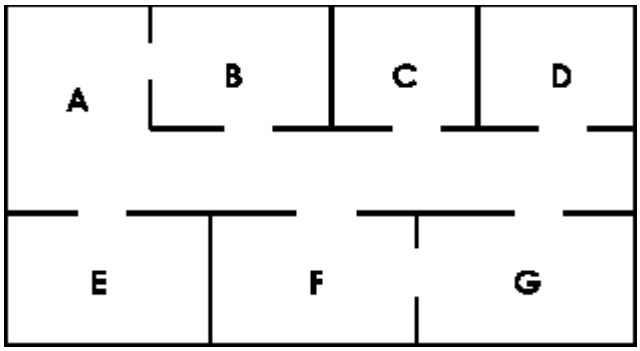


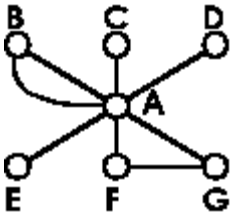
D)



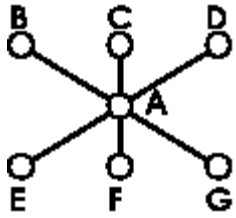
4) 4) _____



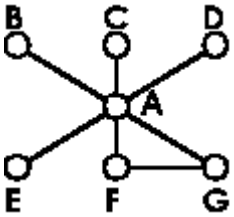
A)



B)



C)



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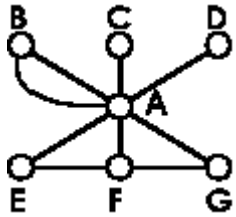
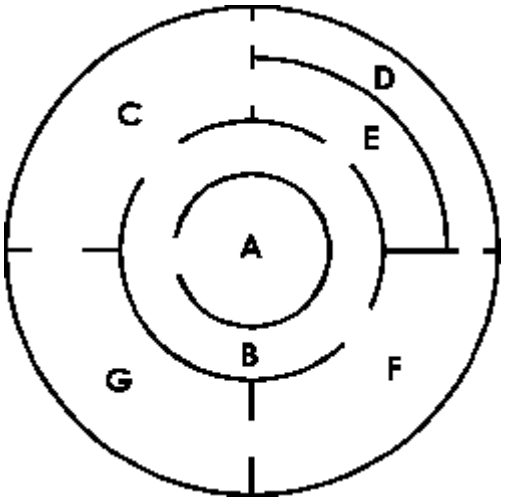
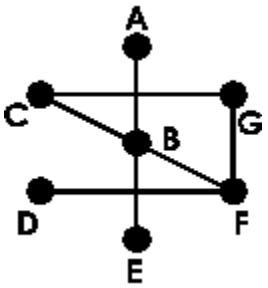
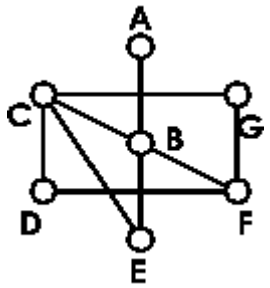


5) 5) _____

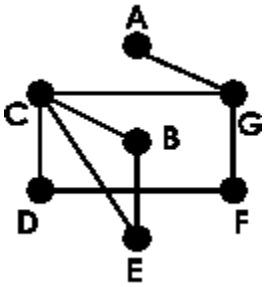


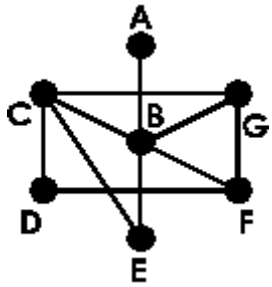
A) B)





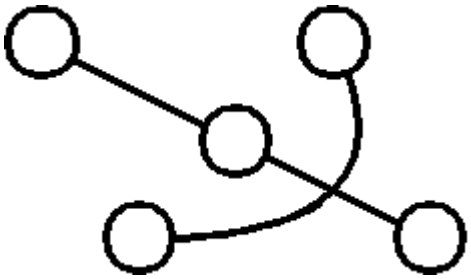
C) D)





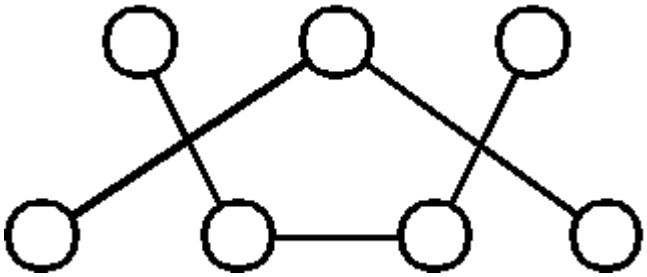
Determine whether the graph is connected or disconnected.

6) 6) _____



A) Disconnected B) Connected

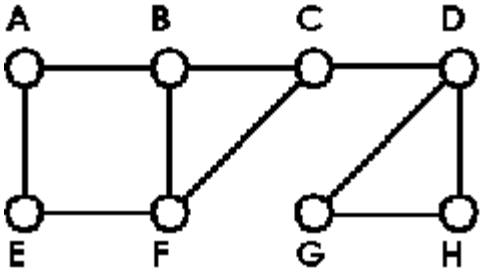
7) 7) _____



A) Connected B) Disconnected

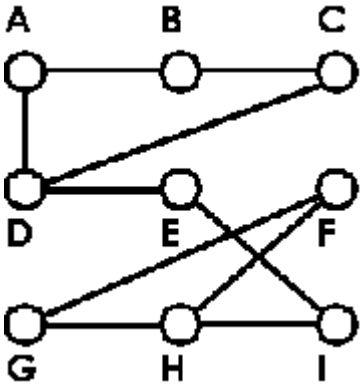
Identify any bridges in the graph or say there are none.

8) 8) _____



A) None B) DH C) CF and DG D) CD

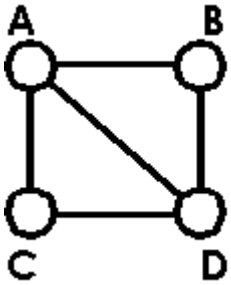
9) 9) _____



A) None B) DE and EI C) DC and GF D) DE, EI, and HI

Give an appropriate answer.

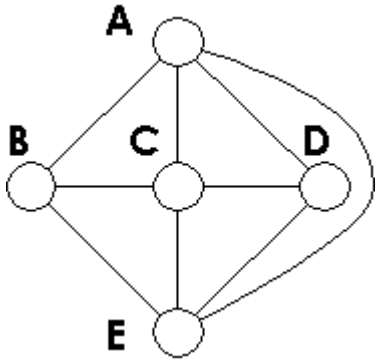
10) Using the following graph, find an Euler path that starts with vertex B. 10) _____



A) B → A → D → C → A → B B) B → A → D → C

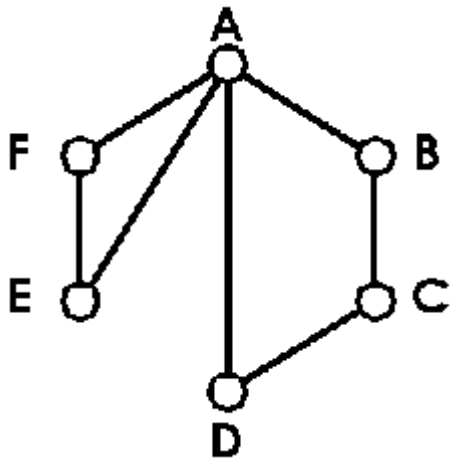
C) No Euler path exists. D) B → A → C → D

11) Using the following graph, find an Euler path that starts with vertex B. 11) _____



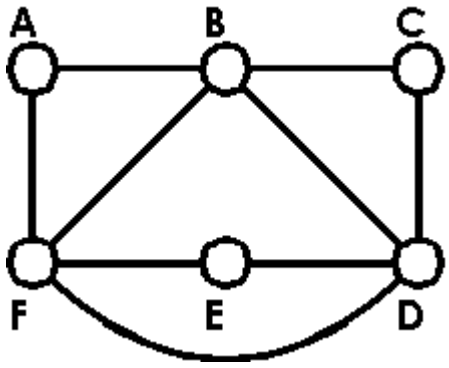
A) B → A → D → E → B → C → A → E → C → D
B) B → E → D → A → C → E → D
C) No Euler path exists.
D) B → A → D → E → C

12) Using the following graph, find an Euler circuit that begins and ends with vertex C. 12) _____



A) No Euler circuit exists.
B) C → D → A → E → F → A → B → C
C) C → D → A → E → F → A → B
D) C → D → A → E → F → A → B → C → D

13) Using the following graph, find an Euler circuit that begins and ends with vertex B. 13) _____



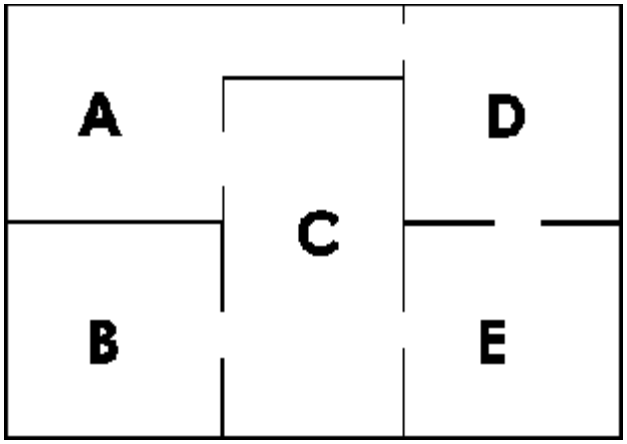
A) B → C → D → E → F → A → B → D → F → B
B) No Euler circuit exists.
C) B → C → D → E → F → A → B → C → D → B → F → D → B
D) B → A → F → E → D → C → B

Solve the problem.

14) The map shows the states Tennessee, Alabama, Georgia, and Mississippi. Is it possible to find a route that starts in Tennessee and crosses each common state border exactly one time? 14) _____

A) Yes B) No

15) For the floor plan below, is it possible to find a path that starts in room C and passes through each doorway exactly one time? 15) _____

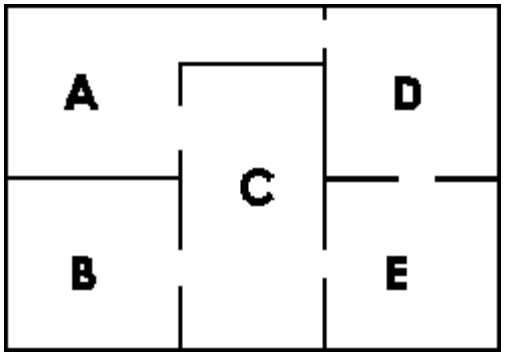


A) No B) Yes

16) The map shows the states New Mexico, Oklahoma, Texas, Arkansas, and Louisiana. Find a route that starts in Texas and crosses each common state border exactly one time. 16) _____

A) TX → LA → AR → TX → OK → NM → TX
B) TX → LA → AR → TX → OK → AR → TX → NM → OK
C) No such route exists.
D) TX → NM → OK → AR → LA → TX

17) Using the floor plan below, find a path that starts in room B and passes through each doorway exactly one time. 17) _____



A) B → C → A → D → E → C

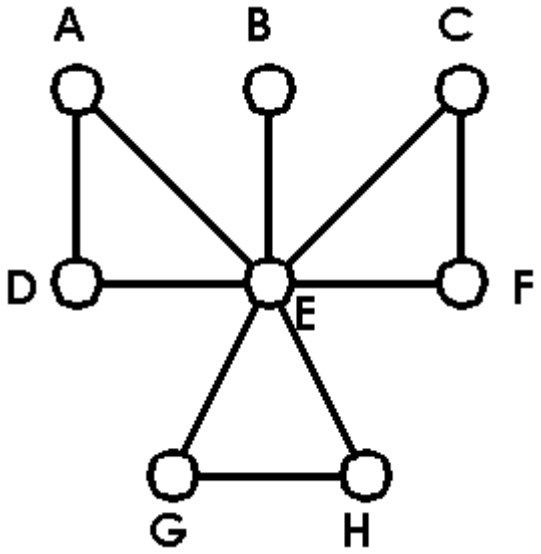
B) B → C → A → D → E → C → B

C) No such path exists.

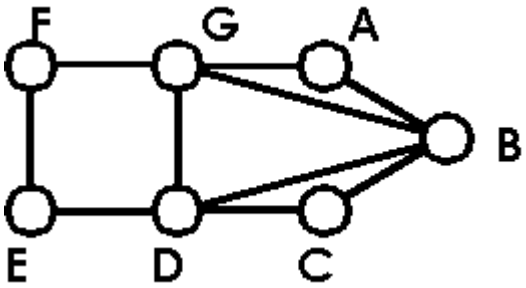
D) B → C → A → D → E

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

18) Use Fleury's algorithm to find an Euler path for the following graph. 18) _____



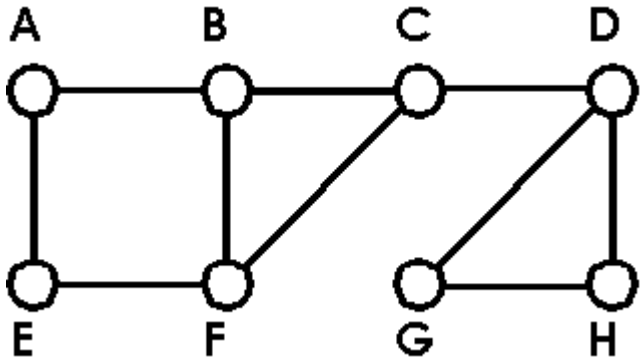
19) Use Fleury's algorithm to find an Euler circuit for the following graph. 19) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

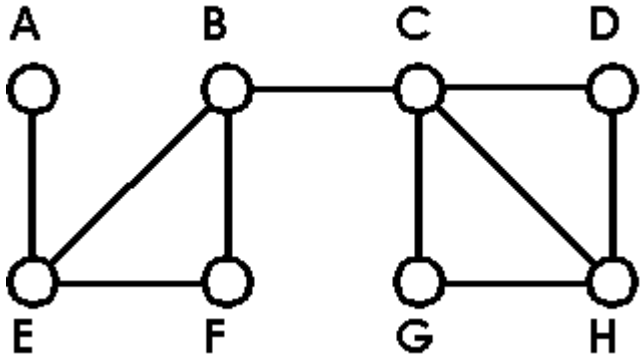
Find two different Hamilton paths for the given graph.

20) 20) _____



A) B → A → E → F → C → D → H → G ; H → G → D → C → F → B → A → E
B) E → A → B → C → D → H → G ; E → F → B → C → D → H → G
C) E → A → B → F → C → D → G → H ; H → G → D → C → F → B → E → A
D) The graph does not have two different Hamilton paths.

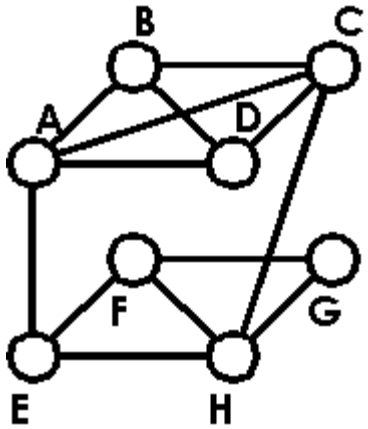
21) 21) _____



A) C → G → H → D → C → B → F → E → A ; H → G → D → C → F → B → A → E
B) A → E → F → B → C → D → H → G ; A → E → F → B → C → G → H → D
C) E → A → E → F → B → C → D → H → G ; A → E → F → B → C → G → H → D
D) The graph does not have two different Hamilton paths.

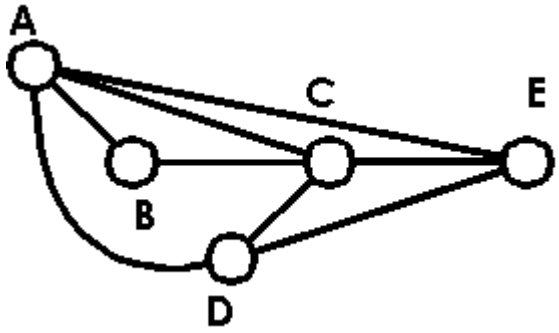
Find two different Hamilton circuits for the given graph.

22) 22) _____



A) D → B → C → H → G → F → E → A → D ; D → C → H → G → F → E → A → B → D
B) The graph does not have two different Hamilton circuits.
C) A → B → C → H → G → F → E → A ; E → F → G → H → C → D → B → A → E
D) C → H → G → F → E → A → B → D → C ; C → D → B → A → F → E → H → G → C

23) 23) _____



A) A → B → C → E → D → C → A ; A → E → D → C → B → A
B) A → B → C → D → E → A ; A → E → D → B → A → C
C) A → B → C → E → D → A ; A → B → C → D → E → A
D) The graph does not have two different Hamilton circuits.

Solve the problem.

24) Audrey Graco plans to conduct book signings in several cities to promote her new novel. She wishes to visit Knoxville, Chattanooga, Chapel Hill, Charlotte, Raleigh, and Richmond. How many different ways can she visit each of these cities and return to her starting point in Wilmington? 24) _____

A) 29 B) 30 C) 720 D) 120

25) Erik Allen repairs photocopy machines. According to his schedule, he needs to visit6 different offices today. How many ways can Erik visit these offices and return to his headquarters? 25) _____

A) 30 B) 120 C) 720 D) 6

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

26) Chelsea Avanos is searching for a job. She lives in Winston–Salem, North Carolina, and has interviews in Tacoma, Washington; Pittsburgh, Pennsylvania; and Gainesville, Florida. The costs for one–way flights between these cities are summarized below: 26) _____

	Gainesville	Pittsburgh	Tacoma	Winston–Salem
Gainesville	–	$353	$746	$408
Pittsburgh	$353	–	$725	$391
Tacoma	$746	$725	–	$1028
Winston–Salem	$408	$391	$1028	–

a) Represent this traveling salesman problem with a complete graph showing the prices of t flights on the appropriate edges.

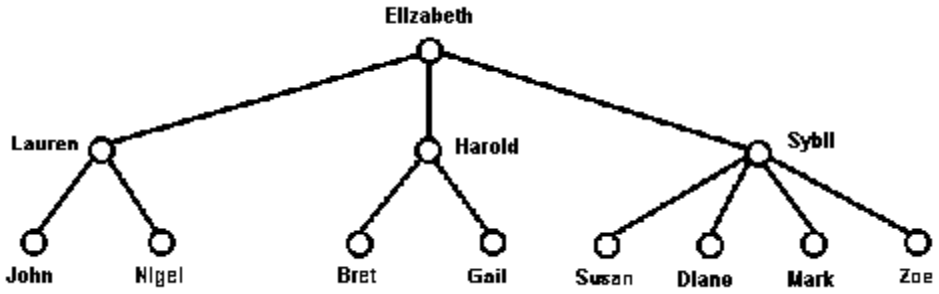
b) Use the Brute Force algorithm to find the least expensive route for Chelsea to travel to ea city and return home to Winston–Salem.

c) What is the minimum cost she can pay?

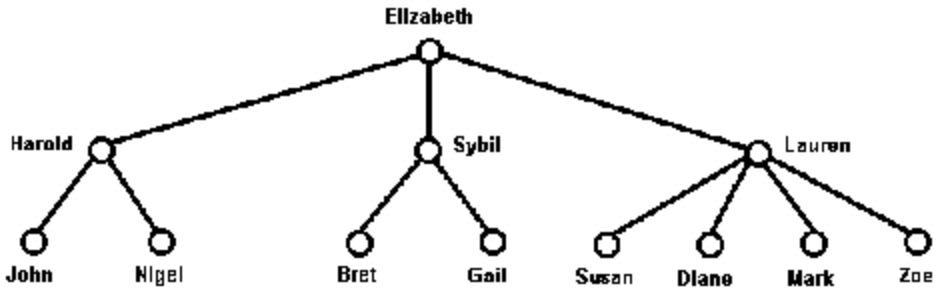
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

27) Use a tree to show the parent–child relationships in the following family. Elizabeth has three children: Harold, Lauren, and Sybil. Harold has two children: John and Nigel. Lauren has two children: Bret and Gail. Sybil has four children: Susan, Diane, Mark, and Zoe. 27) _____

A)



B)



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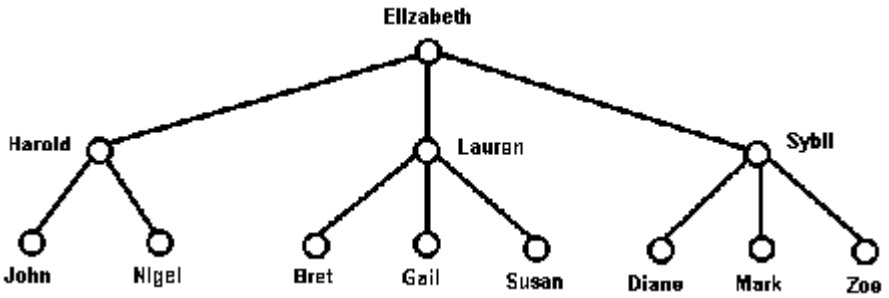
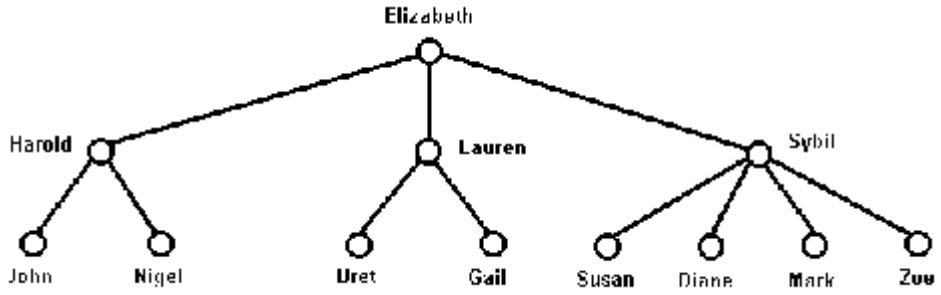
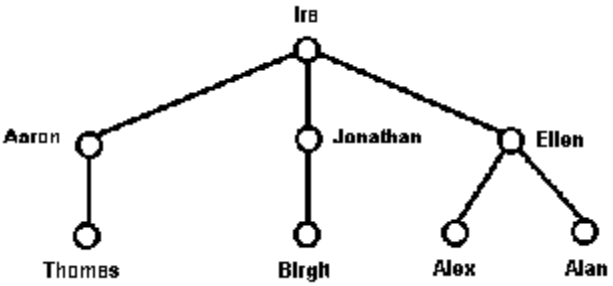


D)

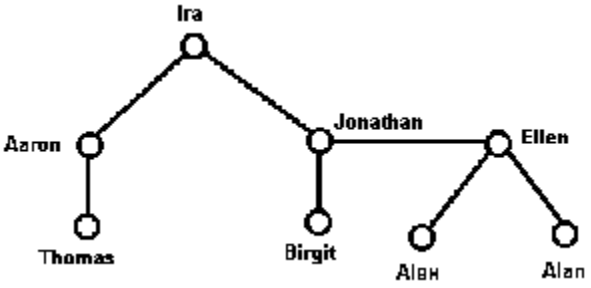


28) Use a tree to show the parent–child relationships in the following family. Ira has three children: Aaron, Jonathan, and Ellen. Aaron has one child: Thomas. Jonathan has one child: Birgit. Ellen has two children: Alex and Alan. 28) _____

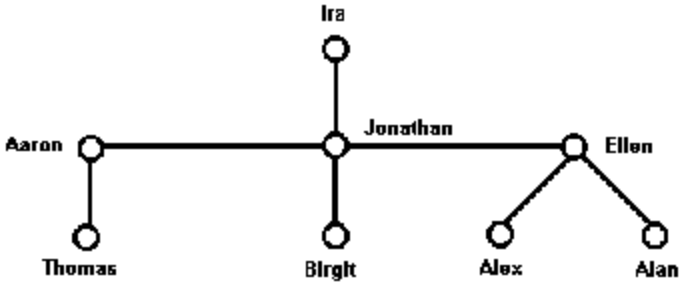
A)



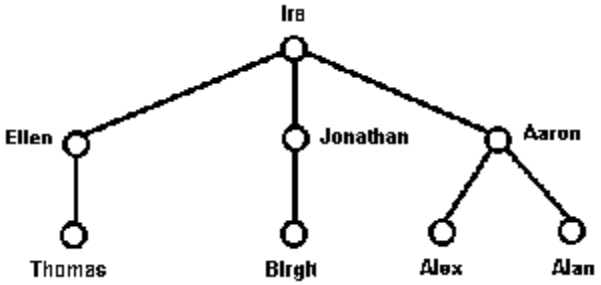
B)



C)



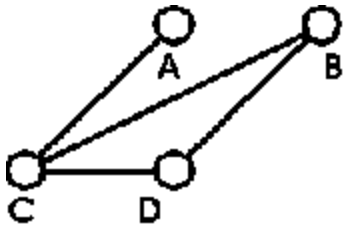
D)



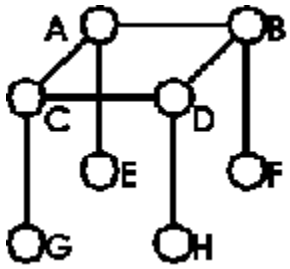
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find two different spanning trees for the graph.

29) 29) _____



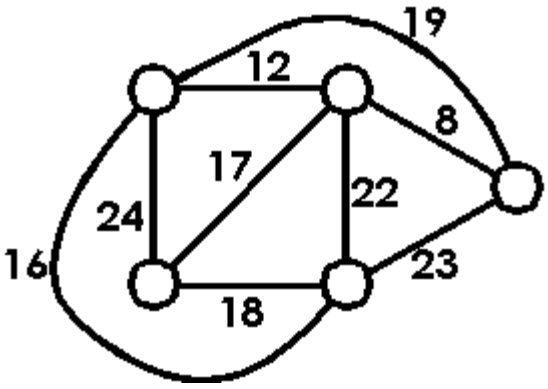
30) 30) _____



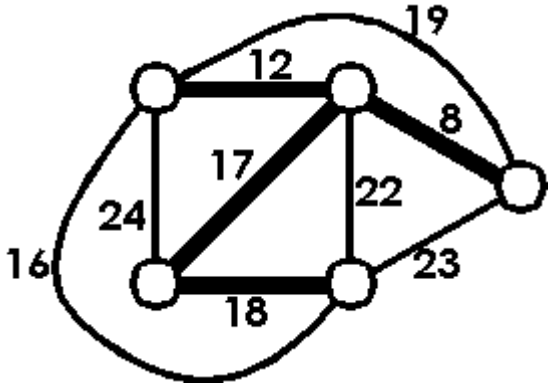
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the minimum–cost spanning tree for the graph.

31) 31) _____



A)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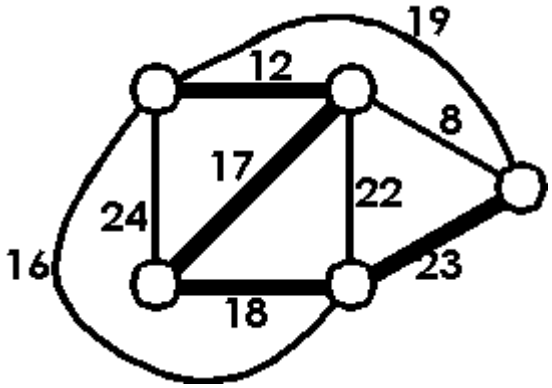
B)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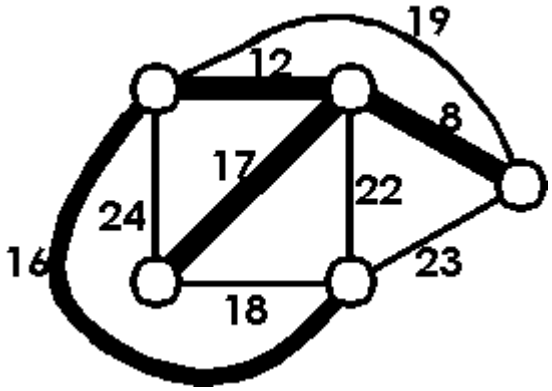
C)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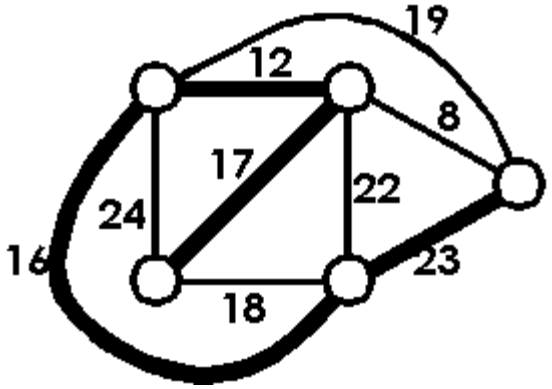
D)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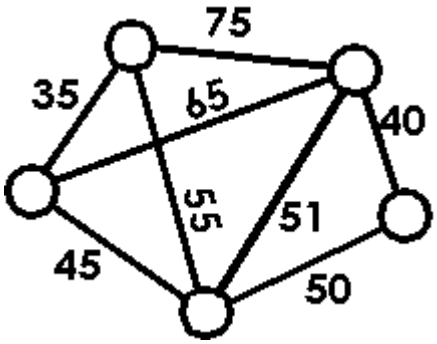
32) 32) _____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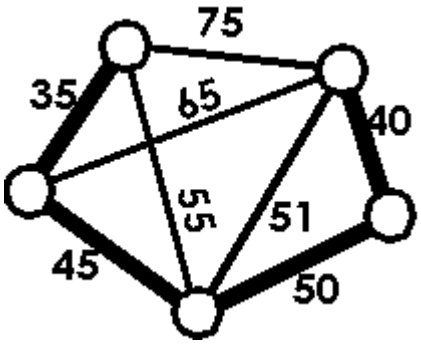
A)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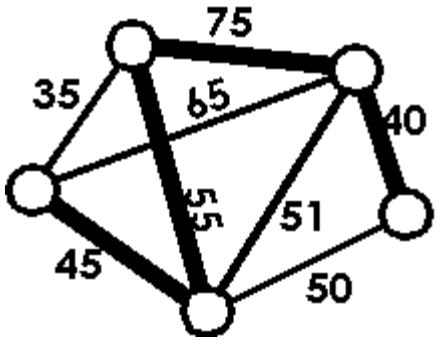
B)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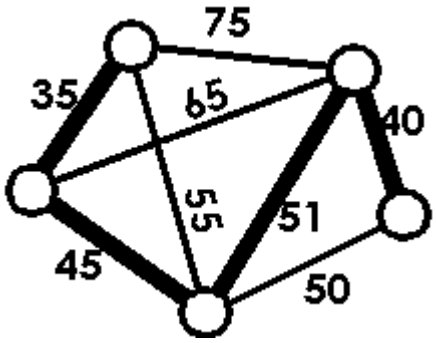
C)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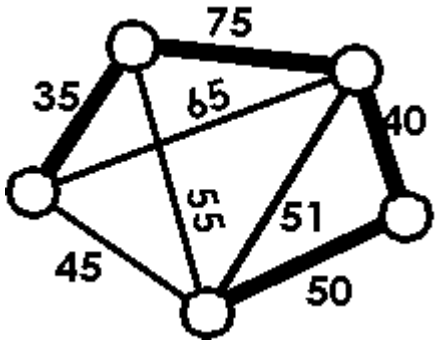
D)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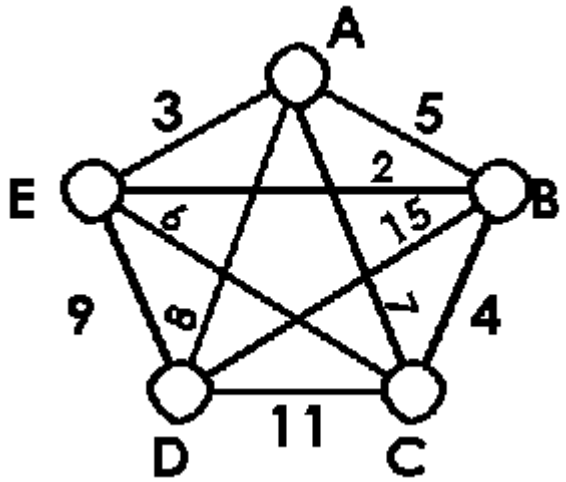
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

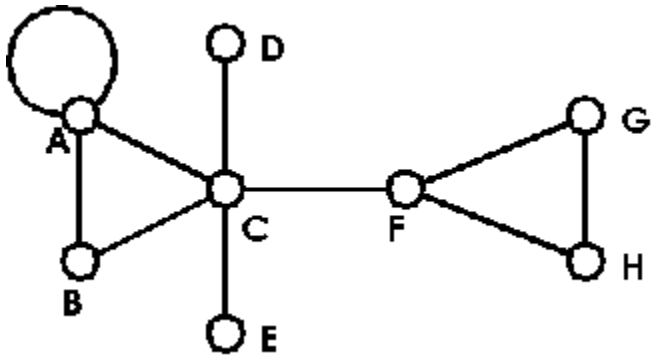
Solve the problem.

33) A school consists of five separate buildings, represented by the vertices in the graph below. There are paths between the buildings as shown. The graph also shows the length in tens of meters of each path. School administrators want to cover some of these paths with roofs so that students will be able to get from each of the buildings to every other building without getting wet when it rains. To minimize the cost, they must select paths to be covered in such a way that the total length to be covered is as small as possible. Use Kruskal's algorithm to determine which paths they should cover. Also, determine the total length of pathways which must be covered under your plan. 33) _____



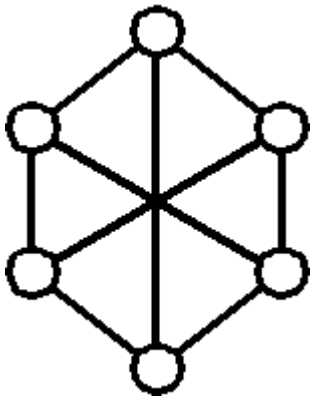
Answer the question.

34) Give an example of each of the following on the graph: odd vertex; even vertex; bridge; loop; circuit; a vertex of degree 5. 34) _____

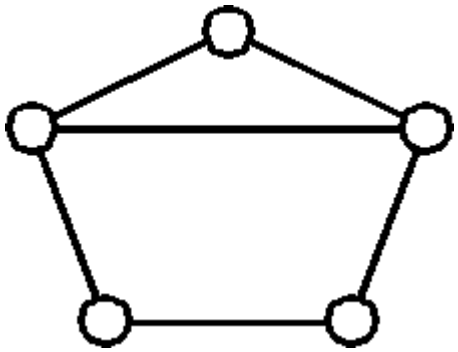


35) Imagine you walk a route that travels along every sidewalk on campus exactly once. If you represented this route with a graph, what would the edges represent? What would the vertices represent? What type of route would this be? Explain. 35) _____

1) Answers will vary. One possibility is:

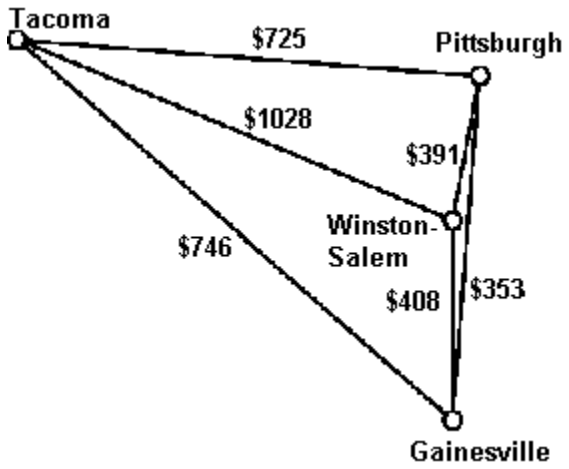


2) Answers will vary. One possibility is:



3) D
4) A
5) B
6) A
7) B
8) D
9) D
10) C
11) A
12) B
13) A
14) A
15) B
16) C
17) A
18) Answers may vary. One possibility is: B → E → C → F → E → H → G → E → D → A → E
19) Answers may vary. One possibility is: F → G → A → B → C → D → G → B → D → E → F
20) A
21) B
22) A
23) C
24) C
25) C

26) a)



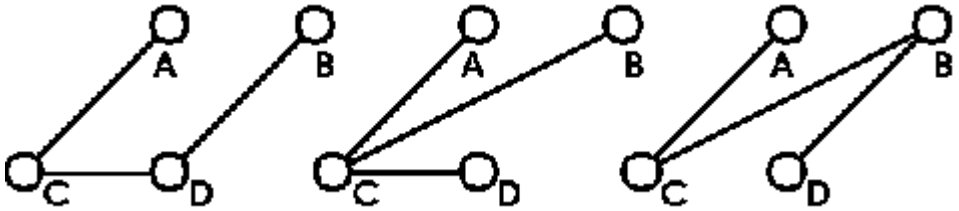
b) WS → G → T → P → WS (or WS → P → T → G → WS)

c) $2270

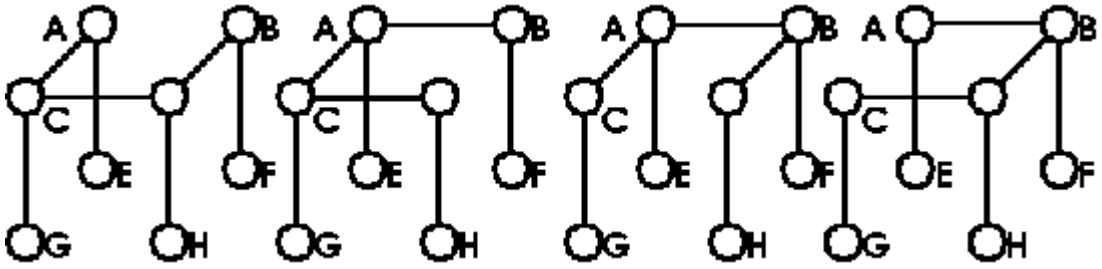
27) D

28) A

29) Answers will vary. The possible answers are:



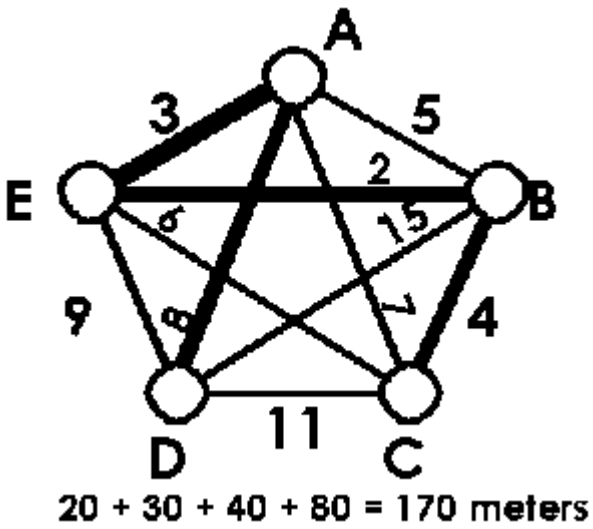
30) Answers will vary. The possible answers are:



31) C

32) A

33)



20 + 30 + 40 + 80 = 170 meters

34) odd vertex: C, D, E, or F
even vertex: A, B, G, or H
bridge: edge CF, edge CD, or edge CE
loop: edge AA
circuit: ABCA or FGHF
vertex of degree 5: vertex C

35) Each sidewalk is an edge, and each intersection of sidewalks is a vertex. The route is an Euler path since it travels every edge exactly once.