Midterm 2 Review Guide

Definitions & Terms: Write your own careful and precise definitions

Graph

Vertex

Edge

Path

Connected

Bridge

Circuit

Tree

Forest

Degree of a vertex

Euler Circuit

Euler Path

Hamilton Circuit

Spanning Tree

Eulerize a Graph

Complete Graph

Algorithm

Efficient vs. Nonefficient

Optimal vs NonOptimal

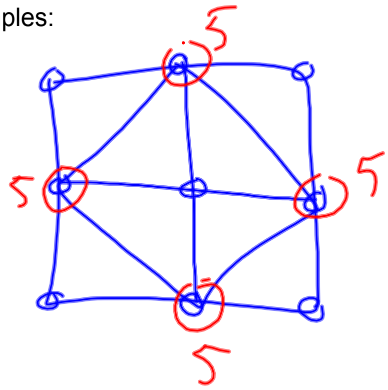
Theorems about Euler Circuits and Euler Paths

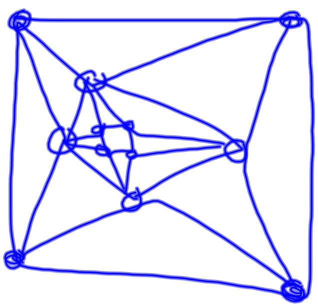
If ________ then there is an Euler Circuit.

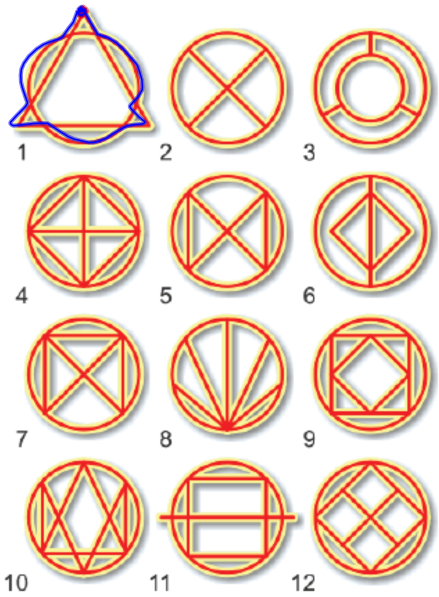
If ________ then " " " Path

If ________ then neither is possible

Examples:

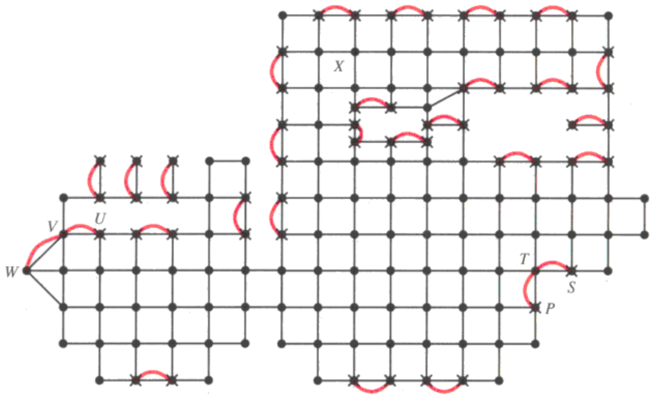






Eulerize a Circuit:

Why would you want to do this? Can you think of a practical example?
How do you do it? Which edges do you add? What do you end up with when you are done?



Algorithms for Hamilton Circuits (List a few and describe them)

Algorithms for Minimum Spanning Trees

List a few and describe them

Hamilton Circuits Section

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.

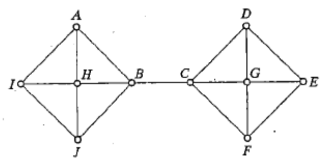


FIGURE 6-30

31. For the weighted graph shown in Fig. 6-38, (i) find the indicated tour, and (ii) give its cost. (*Note*: This is the graph discussed in Example 6.7.)

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

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

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

(d) The nearest-neighbor tour with starting vertex E

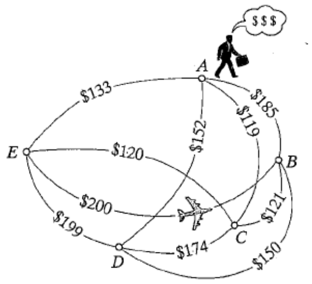


FIGURE 6-38

Spanning Trees Section

In Exercises 5 through 8, assume that G is a graph with no loops or multiple edges, and choose the option that best applies: (I) G is definitely a tree (explain why); (II) G is definitely not a tree (explain why); or (III) G may or may not be a tree (in this case, give two examples of graphs that fit the description—one a tree and the other one not).

6. (a) G has 10 vertices and 11 edges and is a connected graph.

(b) G has 10 vertices and 9 edges.

(c) G has 10 vertices and for some pair of vertices X and Y in G there are two paths from X to Y.

(d) G has 10 vertices and for every pair of vertices X and Y in G there is at least one path from X to Y.

(e) G has 10 vertices and for every pair of vertices X and Y in G there is exactly one path from X to Y.

8. (a) G has 10 vertices, and there is a Hamilton circuit in G.

(b) G is connected and has 10 vertices. Every vertex has degree 9.

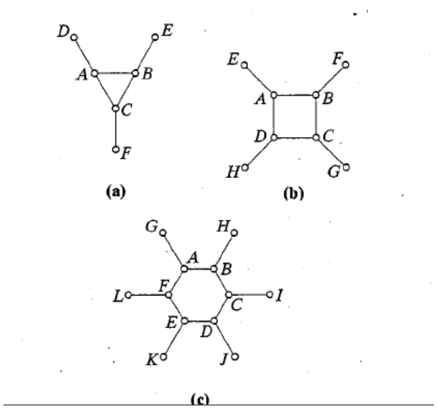
(c) G is connected and has 10 vertices. One of the vertices has degree 9, and all other vertices have degree less than 9.

(d) G is connected and has 10 vertices, and every vertex has degree 2.

16. (a) Find all the spanning trees of the network shown in Fig. 7-38(a).

(b) Find all the spanning trees of the network shown in Fig. 7-38(b).

(c) How many different spanning trees does the network shown in Fig. 7-38(c) have?



22. For the network shown in Fig. 7-44,

(a) find the MST of the network using Kruskal's algorithm.

(b) give the weight of the MST found in (a).

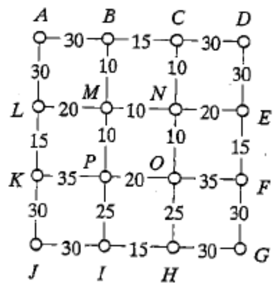


FIGURE 7-44

Is there more than one MST for this graph?

How is that possible?

Are they all "optimal"?

41. Give an example of a graph with $N = 11$ vertices and $M = 10$ edges having

(a) exactly one circuit.

(b) exactly two circuits.

(c) exactly three circuits.

JOGGING

51. (a) How many spanning trees does the network shown in Fig. 7-65(a) have?

(b) How many different spanning trees does the network shown in Fig. 7-65(b) have?

(c) How many different spanning trees does the network shown in Fig. 7-65(c) have?

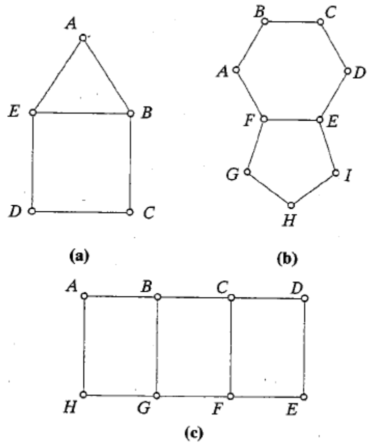


FIGURE 7-65