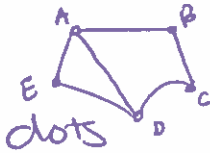


Key

Graph:



mathematized picture. (lines connecting dots)

Vertices:

dots

Edges:

lines

Loops:

an edge that connects a vertex to itself



Multiple Edges:

two edges that connect same pair of vertices



Vertex Set:

 $V: \{A, B, \dots\}$ 

Edge Set:

 $E: \{AB, BB, \dots\}$ 

Isolated Vertices:

no edges

•A    •B

Adjacent:

two vertices joined by an edge are adjacent; two edges are adjacent if they share a vertex.

Circuit:

"closed" → ends up where it began.

Path:

"open" trip → start + end are different

Length:

# of edges in a path/circuit

Connected:

graph is all one piece.

Disconnected:

graph w/ separate components

Components:

pieces of graphs.

Bridge:

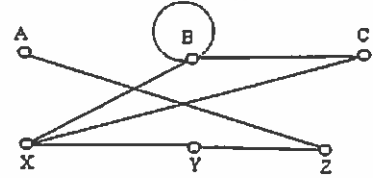
an edge that if removed makes a connected graph ← disconnected graph.

Euler Path: *a path that travels on every edge*

Euler Circuit: *a circuit that travels on every edge*

1. Give the vertex set  $V$ .  $V: \{A, B, C, X, Y, Z\}$

2. Give the edge set  $E$ .  $E: \{AX, BX, BC, CX, XY, YZ, BB\}$



3. List the degree of each vertex.

$A-1, B-4, C-2, X-3, Y-2, Z-2$

Consider the graph with  $V = \{A, B, C, D, E\}$  and  $E = \{AA, AE, BC, BD, DD, DE\}$ . Without drawing a picture of the graph.

4. List all the vertices adjacent to D.  $B, E$

5. List all the edges adjacent to BD.  $BC, DD, DE$

6. Find the degree of D.  $4$

7. Find the sum of the degree of the vertices.

$A-3, B-2, C-1, D-4, E-2 = 12$

8. Find all the circuits of length 1.

$G, G$

9. Find all the circuits of length 2.

$F, G, G / H, G, G$

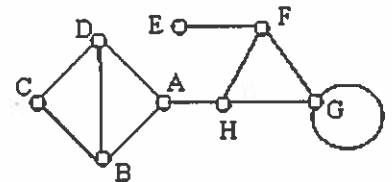
10. Find all the circuits of length 3.

$D, C, B, D / D, B, A, D / F, H, G, F$

11. Find all the circuits of length 4.

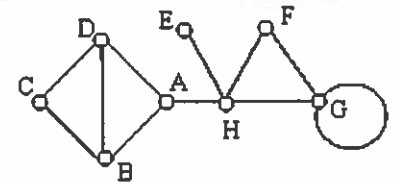
$D, C, B, A, D / G, H, F, G, G$

~~12.~~ What is the total number of circuits in the clockwise rotation in the graph?



13. What are the bridges in the graph?

$AH, EH$



14. What are the bridges given  $V = \{A, B, C, D, E\}$  and  $E = \{AB, AE, BD, CD, CE, DD, DE\}$ ?

$None$

15. What are the bridges given  $V = \{A, B, C, D, E\}$  and  $E = \{AB, BC, BD, BE\}$ ?

