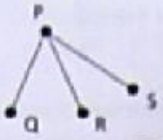
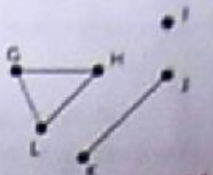
Determine the number of vertices and edges in the vertex-edge graph.

1. 

V = 3
E = 3

2. 

V = 4 E = 3

3. 

V = 6 E = 4

The graph at the right represents five people at a party: Alexis (A), Jennifer (J), Kyle (K), Rachel (R), and Shala (S). An edge connecting two vertices indicates that those two people had a conversation during the party.

Determine whether the statement is true or false:

4. Jennifer had a conversation with everyone. T

5. Alexis had a conversation with 3 different people. F

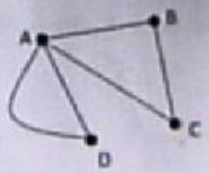
6. Shala had a conversation with 2 different people. T

7. Rachel had a conversation with Shala. F

Each vertex-edge graph represents a rest stop in a national park. An edge connecting the two vertices indicates the rest stops are connected by a hiking trail. Write a matrix that represents the vertex-edge graphs.

8. 

	A	B	C	D
A	0	1	0	1
B	1	0	1	1
C	0	1	0	1
D	1	1	1	0

9. 

	A	B	C	D
A	0	1	1	2
B	1	0	1	0
C	1	1	0	0
D	2	0	0	0

10. Find A^3.

	A	B	C	D
A	2	1	2	1
B	1	3	1	2
C	2	1	2	1
D	1	2	1	3

11. Find A^3.

2	7	7	12
7	2	3	2
7	3	2	2
12	2	2	0

12. Using 2 paths, how many ways are there to get from D to B?

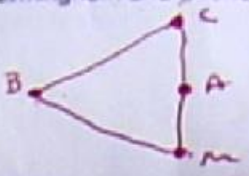
2 ways

13. Using 3 paths, how many ways are there to get from A to B?

7 ways

An airline serves four cities, Atlanta, Birmingham, Chattanooga, and Macon. There are flights between Atlanta and Chattanooga, Atlanta and Macon, Birmingham and Chattanooga, & Birmingham and Macon.

14. Draw a vertex-edge graph to represent this situation.



15. Write a matrix, A, that represents the vertex-edge graph.

$$\begin{array}{c} \\ A \\ B \\ C \\ M \end{array}\begin{bmatrix} A & B & C & M \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \end{bmatrix}$$

16. Use the matrix in #15 to calculate A^2.

$$\begin{bmatrix} 2 & 2 & 0 & 0 \\ 2 & 2 & 0 & 0 \\ 0 & 0 & 2 & 2 \\ 0 & 0 & 2 & 2 \end{bmatrix}$$

17. Using two flights, how many ways can you get from Chattanooga to Macon? List the ways.

2 ways

Find the area of the triangle with the following vertices:

18. $(-1,2)$, $(3,-1)$, $(2,-3)$

$\frac{11}{2} = 5.5$

19. $\left(\frac{1}{2},3\right)$, $(-3,-1)$, $\left(3,\frac{1}{2}\right)$

$\frac{75}{8} \rightarrow 9.375$

Solve the following systems:

20. $2x+3y=0$
$5x+7y=-1$

$$\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -7 & 3 \\ 5 & -2 \end{bmatrix}\begin{bmatrix} 0 \\ -1 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -3 \\ 2 \end{bmatrix}$$

21. $3x+6y+z=3$
$x+3y+z=3$
$3x+y-2z=-5$

$$\begin{bmatrix} 3 & 6 & 1 \\ 1 & 3 & 1 \\ 3 & 1 & -2 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 3 \\ -5 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -7 & 13 & 3 \\ 5 & -9 & -2 \\ -8 & 15 & 3 \end{bmatrix}\begin{bmatrix} 3 \\ 3 \\ -5 \end{bmatrix} = \begin{bmatrix} 5 \\ -2 \\ 4 \end{bmatrix}$$