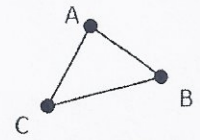
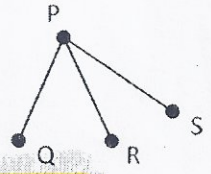
Math 3 Unit 1- Matrices Vertex Edge Graphs

Name _____ Date _____

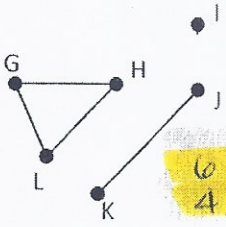
Determine the number of vertices and edges in the vertex-edge graph.

1. 

3 vertices
3 edges

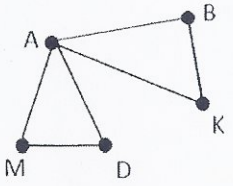
2. 

4 vertices
3 edges

3. 

6 vertices
4 edges

The graph at the right represents five people at a party: Allerie (A), Beth (B), Kathryn (K), Melissa (M), and Dave (D). An edge connecting two vertices indicates that those two people had a conversation during the party.



Determine whether the statement is true or false:

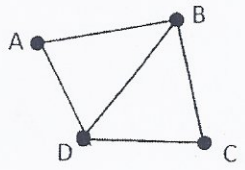
4. Allerie had a conversation with everyone. true

5. Beth had a conversation with 3 different people. false

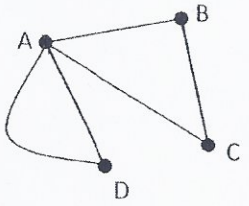
6. Melissa had a conversation with 2 different people. true

7. Kathryn had a conversation with Dave. false

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^2.

	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.

	A	B	C	D
A	2	7	7	12
B	7	2	3	2
C	7	3	2	2
D	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.

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

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

$$\begin{array}{c} \\ A \\ B \\ C \\ M \end{array}\begin{array}{c} \begin{array}{cccc} A & B & C & M \end{array} \\ \begin{bmatrix} 2 & 2 & 0 & 0 \\ 2 & 2 & 0 & 0 \\ 0 & 0 & 2 & 2 \\ 0 & 0 & 2 & 2 \end{bmatrix} \end{array}$$

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

2 ways
Chatt → Birmingham → Macon
Chatt → Atlanta → Macon

Find the area of the triangle with the following vertices:

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

$$\pm\frac{1}{2}\begin{vmatrix} -1 & 2 & 1 \\ 3 & -1 & 1 \\ 2 & -3 & 1 \end{vmatrix} = -\frac{1}{2}(-11)$$

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

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

$$= +\frac{1}{2}(18.75)$$

$$= 9.375 \text{ or } 15/8$$

Solve the following systems:

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

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

A ↑ B

(-3, 2)

$A^{-1} \cdot B$

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

A B

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

(3, -2, 6)

$A^{-1}B$

22. No Soln.

23. $(2z+1, z, z)$