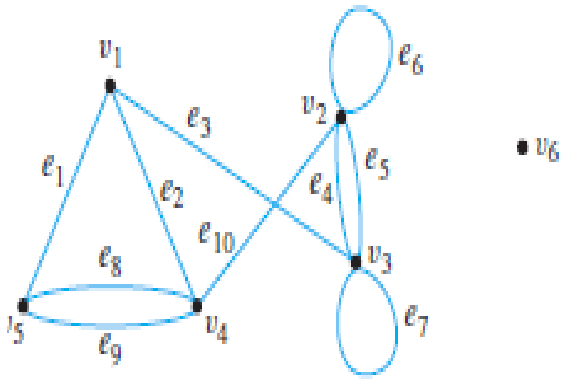
I. Define the following:

1. Simple graph
2. Multi graph
3. Loop
4. Incident
5. Parallel Edge
6. Regular graph
7. Complete graph
8. Connected graph
9. Disconnected graph
10. Euler circuit
11. Hamiltonian path
12. Euler graph
13. Hamiltonian graph
14. Tree
15. Rooted tree
16. Complete n-tree
17. Offspring
18. Leaves
19. Level of tree
20. Height of tree
21. Walk
22. Cycle
23. Spanning of tree
24. Sub-tree
25. Isomorphism of graph
26. Trail
27. Path
28. Pendant vertex.

II. Answer the following question by observing the given graph.



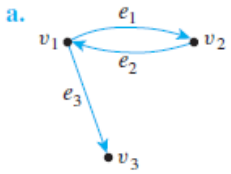
1. Is it simple graph?
2. Write the degree of each vertex and classify it.
3. Write the adjacent vertex to vertex v_2.
4. Write the all parallel edges
5. Write the closed walk for vertex v_1
6. Is it Euler graph?
7. Is it Hamiltonian graph?
8. Is it connected or disconnected.
9. Write the adjacency matrix.
10. Write any one cycle for vertex v_3.

III. Draw the graph with specified property or explain why no such graph exist.

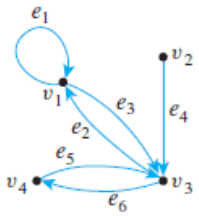
1. Simple graph with 5 vertices of degree 2, 3, 3, 3, and 5.
2. Simple graph with 4 vertices of degree 1, 2, 3, 4.
3. Graph with 5 vertices with degree 1, 2, 3, 3, 5.
4. Simple graph with 5 vertices of degree 1, 1, 1, 4.

IV. Find the adjacency matrices for the following directed graphs.

a.



b.

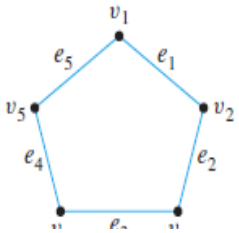


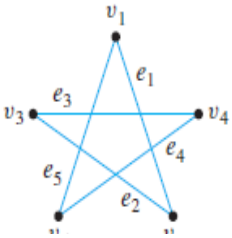
V. Find directed graphs that have the following adjacency matrices:

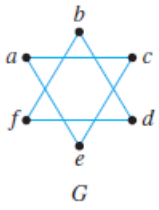
a.
$$\begin{bmatrix} 1 & 0 & 1 & 2 \\ 0 & 0 & 1 & 0 \\ 0 & 2 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

b.
$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 2 & 0 & 1 & 0 \\ 1 & 2 & 1 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

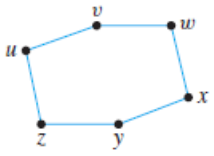
VI. Check whether following graphs are isomorphic or not?







G



G'

VII. Consider the tree with root v_0 shown below.

a. What is the level of v_5?

b. What is the level of v_0?

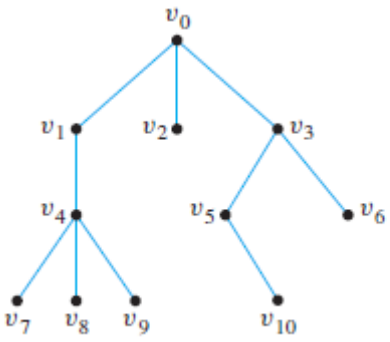
c. What is the height of this rooted tree?

d. What are the children of v_3?

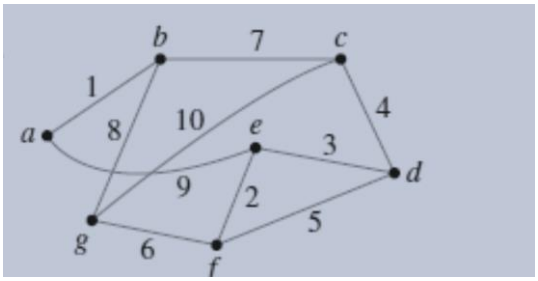
e. What is the parent of v_2?

f. What are the siblings of v_8?

g. What are the descendants of v_3?

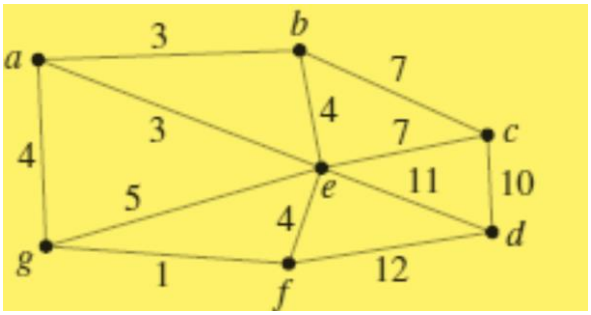


VIII. Use kruskal's algorithm to find minimum spanning tree. Strat with vertex 'e'.



IX. Use primes algorithm to find minimum spanning tree.

Strat with vertex ‘e’.

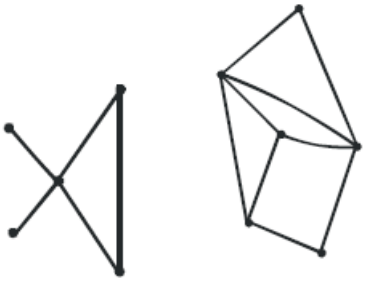


X. Construct the tree for the given algebraic expression.

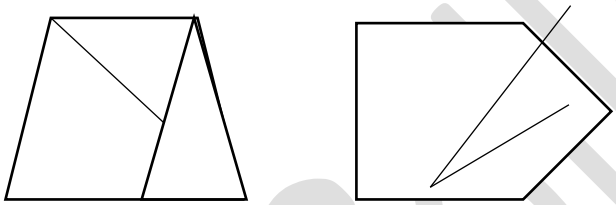
a. 3 – (x+(6*4 / (2-3)))

b. (x / y) / ((x*3) – (z+4))

XI. Which of the following graph is Euler or Hamiltonian?



XII. Which of the following graph is connected or disconnected



XIII. Draw K_5 graph.