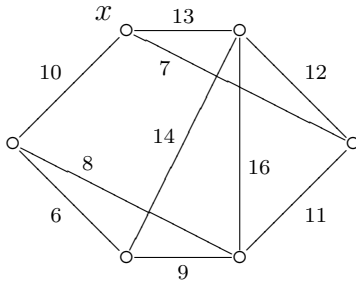
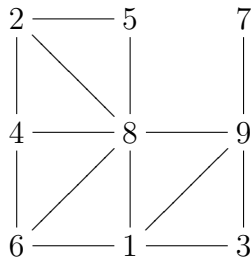


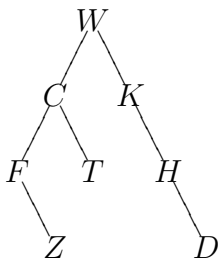
1. (2 points) Find the MST Sequence using Prim's Algorithm starting at vertex  $x$ .



2. (2 points) Draw the DFS Spanning Tree starting at vertex 1 and write the DFS Sequence.



3. (4 points) Find the result of (a) Post-Order (b) In-Order Algorithm.



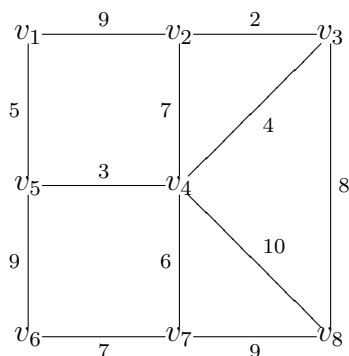
4. (3 points) Given the adjacency matrix  $A$ , find the number of triangles from the diagonal of  $A^3$

$$A = \begin{bmatrix} 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 1 \\ 1 & 1 & 0 & 1 & 0 \end{bmatrix}$$

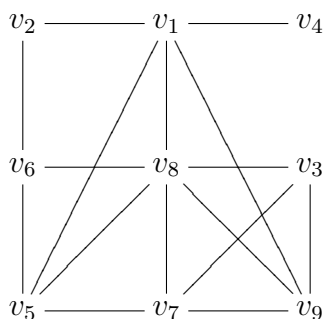
5. (3 points) Given the weight matrix  $W$ , find the distance matrix.

$$W = \begin{bmatrix} 0 & 12 & 0 & 14 & 3 \\ 12 & 0 & 8 & 0 & 4 \\ 0 & 8 & 0 & 9 & 5 \\ 14 & 0 & 9 & 0 & 7 \\ 3 & 4 & 5 & 7 & 0 \end{bmatrix}$$

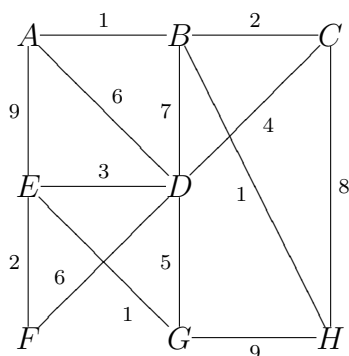
6. (3 points) Use Dijkstra's Algorithm to find Row (6) of the distance matrix and draw the spanning tree.



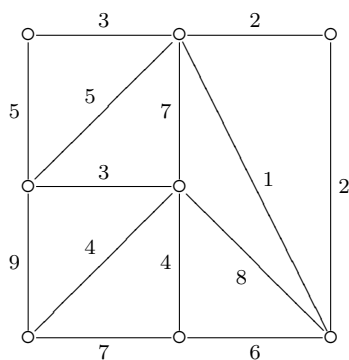
7. (3 points) Color the graph and find the Color Sequence using Welsh-Powell Algorithm.



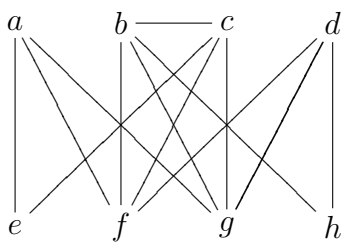
8. (3 points) Solve the Chinese Postman Problem (complete solution).



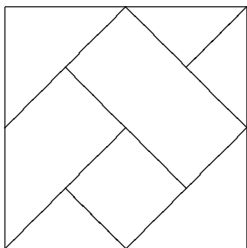
9. (4 points) Draw all Hamilton cycles and solve the Traveling Salesman Problem.



10. (4 points) Prove planar or not planar using Hamilton cycle.

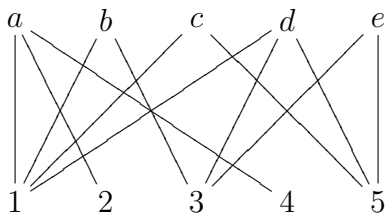


11. (3 points) Given the map, draw the dual graph and find the chromatic number.



12. (2 points) Prove that  $\overline{P_{10}}$  is not planar using Euler's test.

13. (2 points) Find a complete matching or prove not exist.



14. (2 points) Prove: If  $G$  is a tree with  $\geq 3$  leaves, then  $\overline{G}$  is not bipartite.