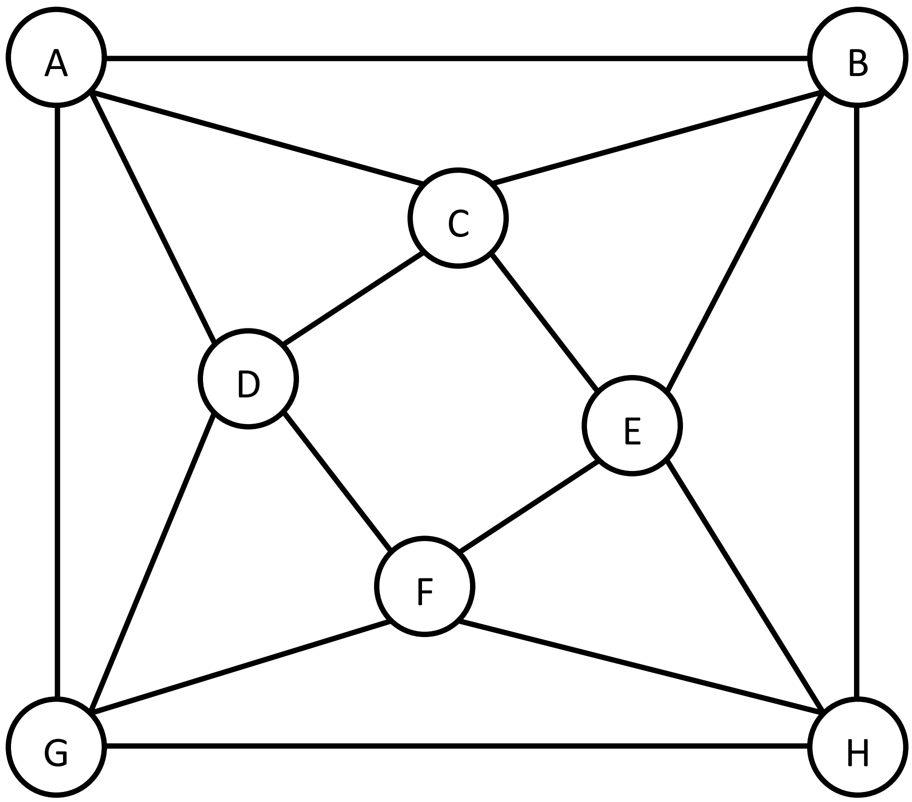
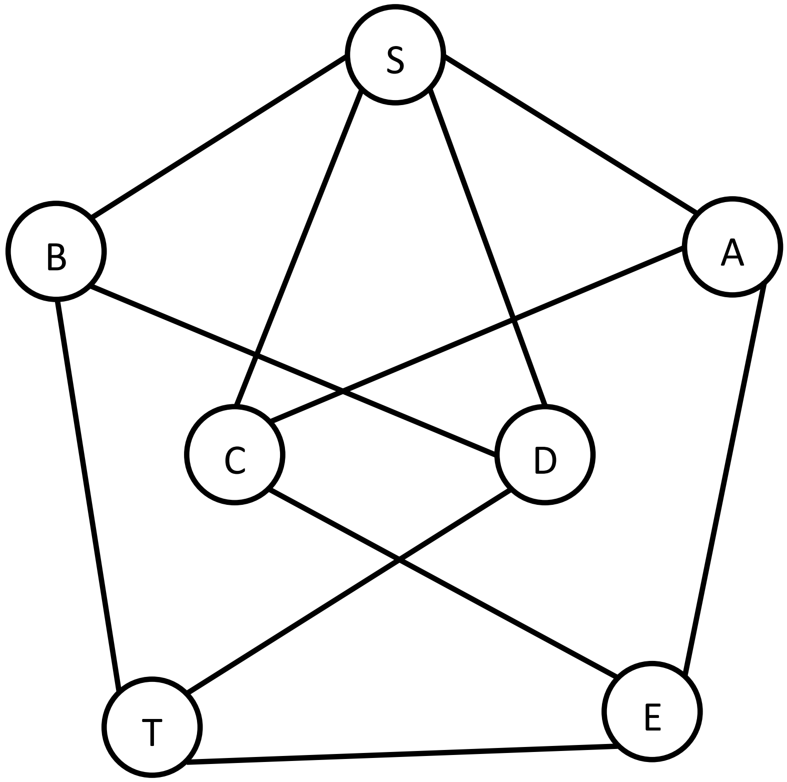
Name ____ Discrete II, Test 2

1) Show that the graph below has a tour from vertex A through every edge exactly once, that then ends again at vertex A. (10 points)

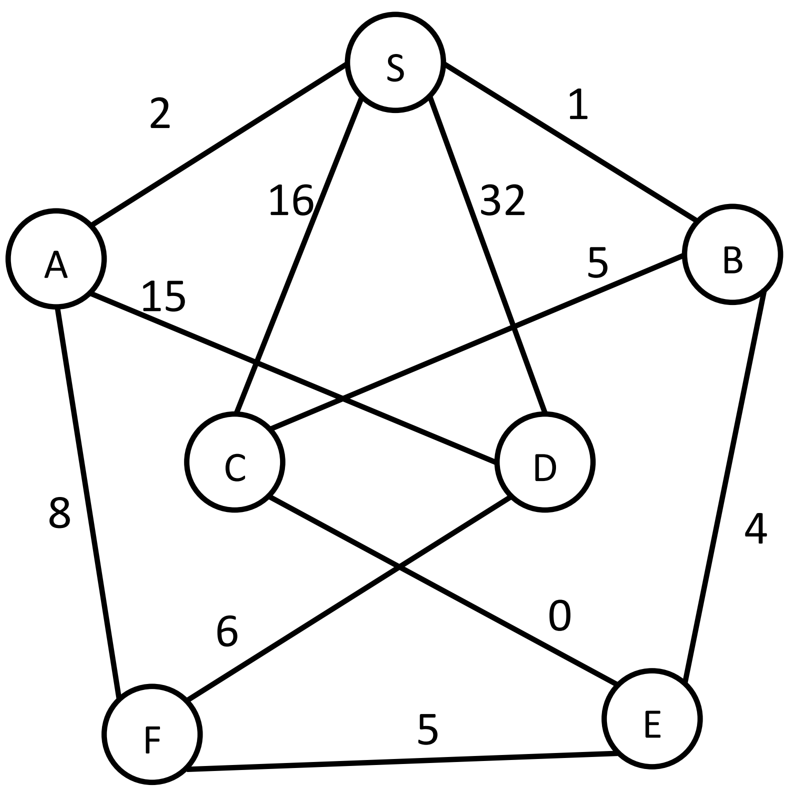


2) Draw a graph having exactly 6 vertices, with each vertex of degree 3. (15 points)

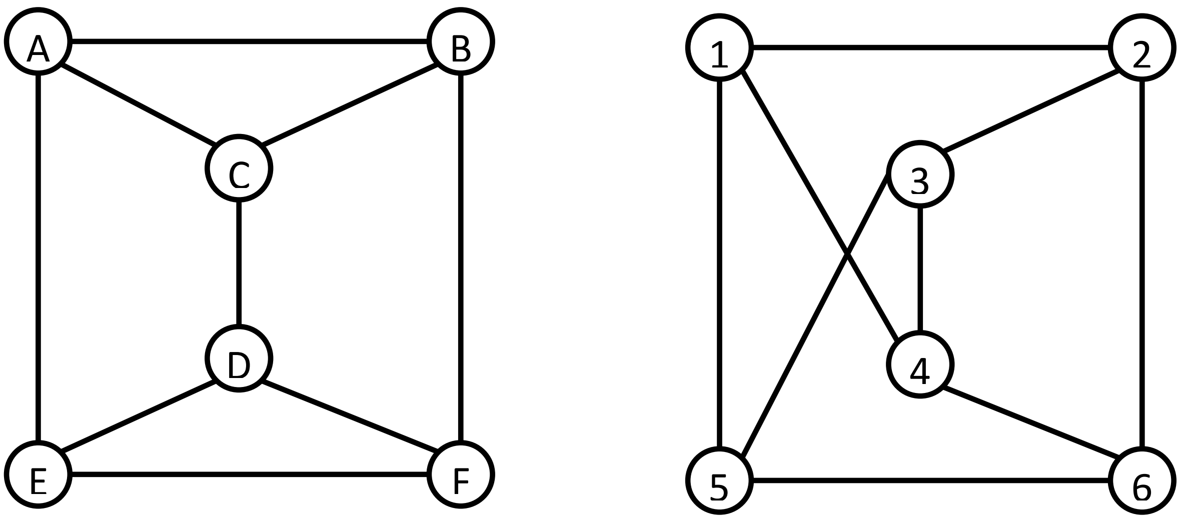
3) Use a depth-first search algorithm to find a path from S to T. Use the natural ordering on the alphabet. (10 points)



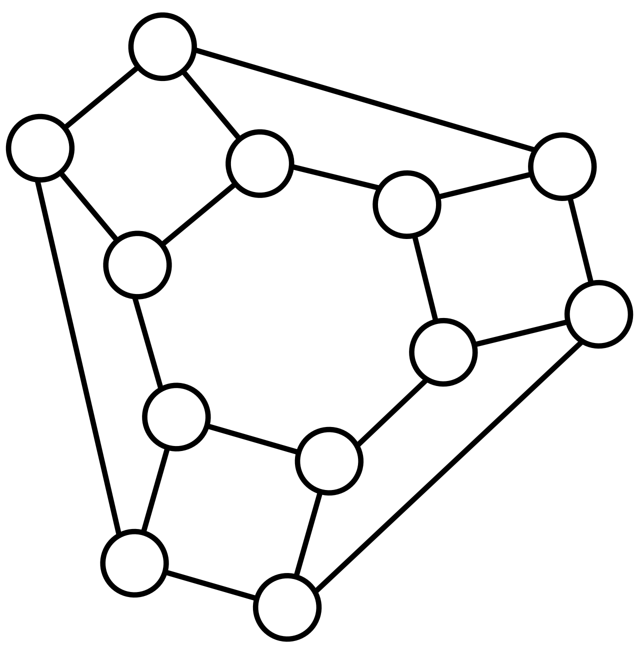
4) Use Dijkstra's Algorithm to find a shortest path tree rooted at vertex S, spanning the whole tree. (15 points)



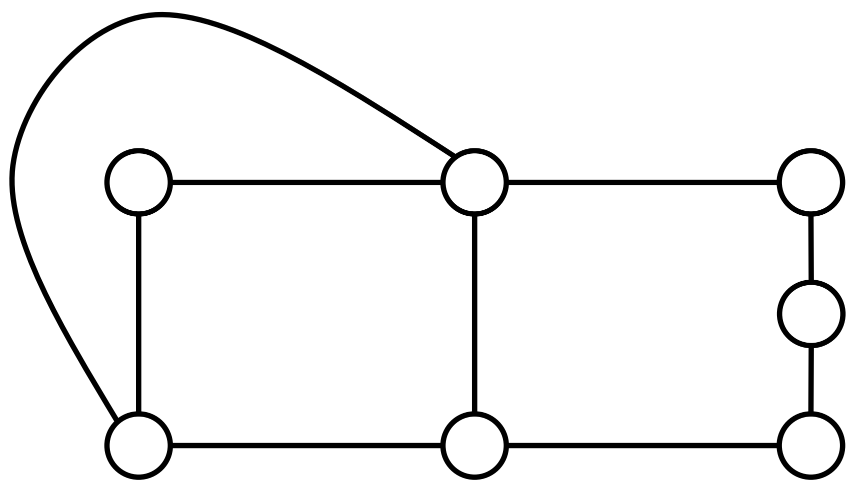
5) Determine whether the two graphs below are isomorphic. Justify your answer. (Answer: 2 points. Justification: 10 points)



6) Color the vertices in the graph below using a proper coloring and as few colors as possible. (13 points)



A triangulation of a planar graph is new graph obtained from the original by connecting as many vertices as possible while maintaining planarity (and of course never adding a parallel edge or loop). (15 points)
7) Find a triangulation of the following graph.



8) Explain why in a triangulation of a planar graph with at least 3 vertices: (10 points)

$$3f = 2e$$

Here f is the number of faces, and e is the number of edges.