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 a 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.