Assignment 5

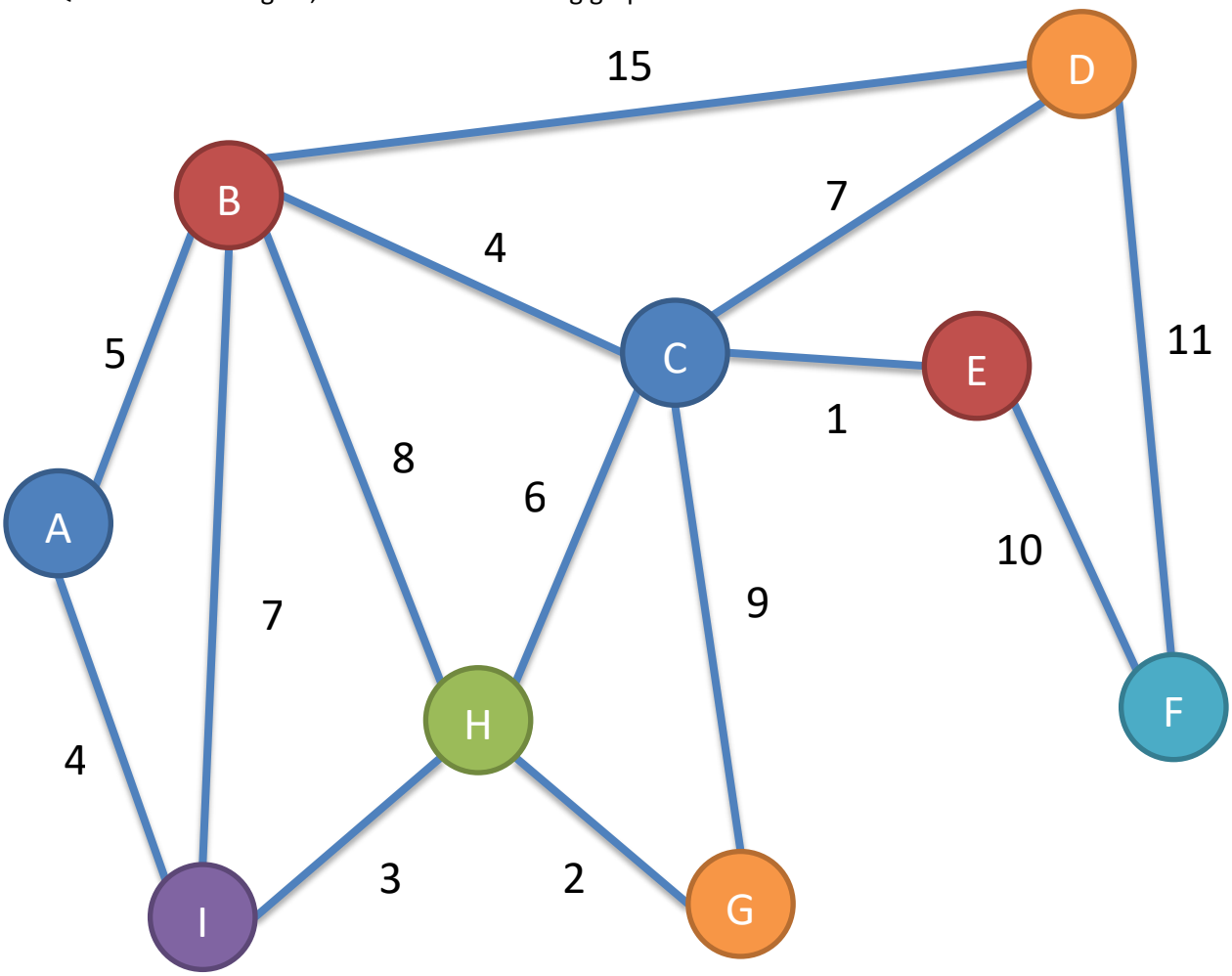
COMP 2100
Due: November 1, 2024

Hint: PowerPoint is an excellent tool for drawing graphs. The results can be pasted into Word.

1. A complete undirected graph with 5 nodes is not planar. That is, there is no way to draw it such that the edges (even if they curve) do not intersect each other. It is clear that removing one edge makes it a planar graph.

   What is the largest number of edges you can draw on a graph with 7 nodes such that it is still planar? Draw the graph.

For Questions 2 through 5, consider the following graph.



2. Give a depth first traversal of the graph, starting at node A. List the nodes and draw a picture of the tree that results from the traversal. When choosing which child to follow first, choose the one that comes first alphabetically. Please keep the nodes in the same relative positions as the original graph.

3. Give a breadth first traversal of the graph, starting at node A. List the nodes and draw a picture of the tree that results from the traversal. When choosing which child to follow first, choose the one that comes first alphabetically. Please keep the nodes in the same relative positions as the original graph.

4. Run Dijkstra's Algorithm on this graph with starting node A. List the shortest distances from A to all other nodes and the predecessor nodes for all nodes other than A.

5. Draw a minimum spanning tree for this graph.

Extra credit:

Prove that any simple, undirected graph with at least two nodes must have at least two nodes with the same degree.