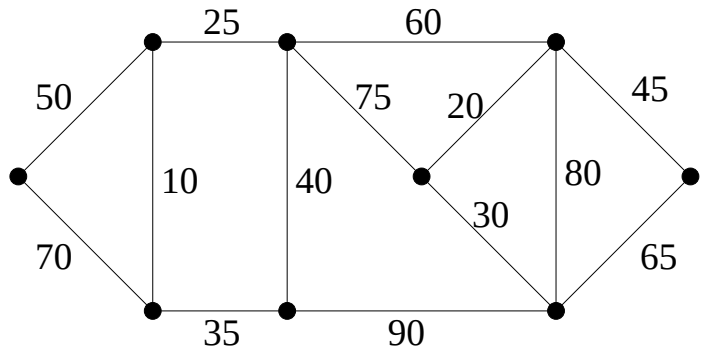
1. Consider the following undirected graph.



   (a) Assume that you use Prim's algorithm to find the Minimum Spanning Tree (MST), using the leftmost vertex as the source. Show the order that the edges are included in the MST. Just list the edges in order by their weights.

   (b) Assume that you use Kruskal's algorithm to find the MST. Show the order that the edges are included in the MST. Just list the edges in order by their weights.

2. Prsident-elect Trump called me the other day at 3am with the following brilliant idea for finding a Minimum Spanning Tree: Start with two different source verticees and grow trees from both vertices. At each step, of all of the edges coming off of either tree, include one with smallest weight in the MST, but do not connect the two trees. When all of the vertices are in one of the two trees, then connect the two trees by the smallest weight edge between them.

   (a) Assume that you use Trump's idea to find the Minimum Spanning Tree. Using the example above, with the leftmost and rightmost vertices as the two sources, show the order that the edges are included in Trump's alleged MST. Just list the edges in order by their weights.

   (b) Write the pseudo code for Trump's algorithm. You can do it in the style of Prim's algorithm (see webpage).

   (c) Does Trump's algorithm find a Minimum Spanning Tree? If so, prove it. If not, give a counter example.

3. A *Hamiltonian path* in an undirected graph $G = (V, E)$ is a simple path that includes all of the vertices of the graph. Consider the problem of determining if an undirected graph $G = (V, E)$ has at least two (different) Hamiltonian paths. Show that this problem is in **NP**. Make sure to state the certificate and give the pseudo code.