ECE 3020 Homework 9
Due Date: Friday, November 3, 3:00 PM

1) Consider a map of the western states of the U.S., i.e. Washington, Oregon, Idaho, Montana, Wyoming, California, Nevada, Utah, Colorado, Arizona, and New Mexico. Draw a graph where the nodes of the graph represent the state capitals of these 11 states and the edges connect pairs of capitals between states that share a border. Thus, Helena will have an edge to Boise and an edge to Cheyenne but no edge to any of the other state capitals, because Montana only has a border with Idaho and Wyoming among these 11 states. Assume that all of the 4 corners states (Utah, Colorado, Arizona, and New Mexico) have borders with each other. Add edge weights to your graph where the weight of an edge is defined to be the straight-line distance between the two cities on either end of the edge. Turn in the graph you construct with all of the cities labeled and weights shown for each edge.

2) Run Prim's Algorithm on your graph from 1), using Carson City as the starting node (v_1 in the pseudocode available on the course Web site) to find a minimum-weight spanning tree. Turn in a drawing of the spanning tree that you construct, and also show the contents of the min_weight array from Prim's Algorithm at every iteration of the algorithm. You can either write a program to run Prim's Algorithm and output the min_weight values or you can run through the algorithm by hand.

3) Run Dijkstra's Algorithm on your graph from 1) to find shortest paths from Carson City to every other capital in the graph. Turn in a drawing of the shortest paths graph that you construct, and also show the contents of the distance array from Dijkstra's Algorithm at every iteration of the algorithm. You can either write a program to run Dijkstra's Algorithm and output the distance array values or you can run through the algorithm by hand. *Note:* Use the simpler array implementation of Dijkstra's Algorithm available on the course Web site instead of the heap implementation given in the text book.