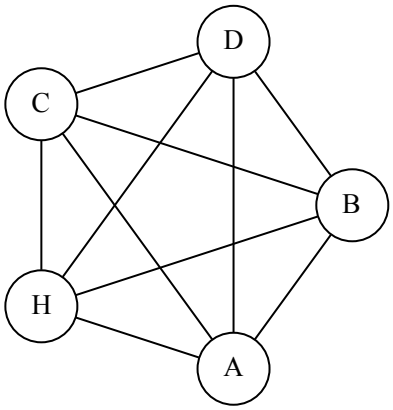
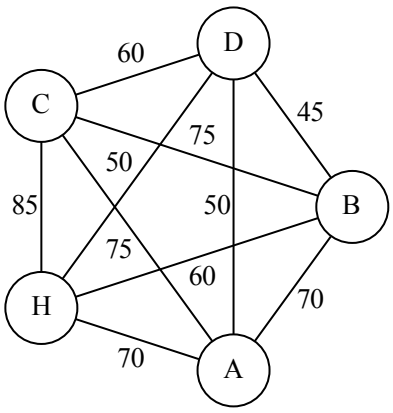
1. Figure 1 has 12 different Hamiltonian cycles. One of them is HDACBH. Notice that this is the same as HBCADH. (Why?) List the other 11 Hamiltonian cycles.



2. You must deliver four packages from your home base at H to the houses A, B, C, and D. The number of minutes it takes to drive from one place to another is shown on the graph in Figure 2. For example, it takes 60 minutes to drive from house D to house C. In what order should you deliver the packages so that you spend the least amount of time on the road?



Apply each of the following methods of solving this problem:

(a) The Nearest Neighbor Algorithm: Starting from home base, first go to the nearest (in time) house. Then go to the nearest house that has not already been visited. Continue this process until you have visited every house; then return home. What route do you get by this process and how long will you spend on the road?

(b) The Sorted Edges Algorithm. First label the edges from shortest (in time) to longest using the labels $e_1, e_2, e_3, \ldots, e_{10}$. (For example, you would label the edge between B and D as e_1 since that is the shortest edge in the graph.) Examine each edge one at a time in order of the labels. If the edge does not (1) makes three edges that you've chosen meet at a vertex and does not (2) close up a circular route that doesn't include all the vertices in the graph, add that edge to your Hamiltonian circuit. If the edge you're examining does not meet both of these criteria, then discard the edge and move on to the next one. What route do you get by this process and how long will you spend on the road?

(c) The Brute Force Algorithm. Since you have already figured out every possible route to use to deliver the packages (in problem 1), you might as well just figure out how long each of those 12 routes would take. Which one is the shortest?

3. (a) Which, if any, of the three algorithms in problem 2 give an **optimal** solution?

(b) Describe any drawbacks you see to any of the algorithms described in problem 2.