1. Are these 2 graphs isomorphic? Give the iso. or explain why none exists

2. Find a lower bound on the minimal-cost traveling salesperson tour for the table on the right (using the method in the text). Suggest a good entry on which to branch. What is the new bound if you do not use this entry? or if you do use this entry?

3. Is the graph with the adjacency matrix on the right connected? Test by trying to build a spanning tree found by a depth-first search starting at a.

4. There are 12 courses in Seawolves Podunk High School that will be using the biology laboratories next semester. The courses have given meeting times. The courses need to be scheduled into the labs (so that courses meeting at the same time are not scheduled in the same labs). Describe how to make a graph coloring model of this problem. In particular, what are the vertices, what are the edges, what are the colors?

5. Draw a planar graph (with no loops or multiple edges) for each of the following properties, if possible. If not possible, explain briefly why not.
   a) 14 edges and 6 regions (how many vertices must there be)
   b) 6 vertices, two of degree 5 and four of degree 4 (how many edges and regions must there be).
   c) has at least 9 vertices, an Euler cycle and requires exactly 2 colors to properly color.

6. Give a careful argument to show that this graph has no Hamilton circuit.

7. Mr. Trump invites three married couples to his penthouse for dinner. Upon arrival, Mr. Trump and the six guests shake hands of some of the other people (none of the guests shakes hands with their spouse). Suppose each of the six guest shakes a different number of hands (possibly one person shakes no hands). In graph terms, we have seven vertices with six of them, the ‘guest vertices,’ paired off into three pairs and no edge between two paired vertices. Each of the six paired vertices has a different degree.
   a) What is the set of the different degrees of the six ‘guest vertices’? Explain.
   b) Did Mr. Trump shake an even or an odd number of hands (is Trump’s vertex of even or odd degree)? Explain.
   c) Exactly how many hands did Mr. Trump shake? Explain (Hint: build a 7-vertex graph in which the guest vertices have the six different degrees given in your answer to part a).