

1. Are these two graphs isomorphic? Give the isomorphism 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?

	1	2	3	4
1	∞	4	6	8
2	4	∞	5	7
3	5	8	∞	6
4	7	5	2	∞

	a	b	c	d	e	f	g
a	0	1	0	1	0	0	0
b	1	0	1	0	0	0	0
c	0	1	0	1	1	0	0
d	1	0	1	0	0	0	0
e	0	0	1	0	0	0	0
f	0	0	0	0	0	0	1
g	1	0	0	0	0	1	0

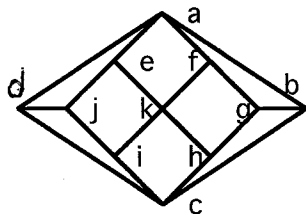
3. Is the graph with the adjacency matrix on the right connected? Test by trying to build a spanning tree found by a depth-first search starting at a.

4. Each of 7 different investment managers are going to visit groups of rich people in Chicago for one day next week; there is some overlap among the rich people different managers will visit. The managers want to develop a schedule of which day each should come to Chicago so that no rich person is visited by two managers on the same day. Describe how to make a graph coloring model of this scheduling problem: 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) 7 vertices and 11 regions (how many edges must there be)
- b) 12 edges, all regions bounded by 3 edges (how many vertices and regions must there be).
- c) has exactly 7 vertices, has an Euler cycle and 3 is the minimum vertex coloring number.

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



7. In a round-robin tournament of n people (where each pair of people play one game), one must produce a schedule of who plays whom each day (a person has at most one match a day). Model this scheduling problem as an edge coloring problem; define first what you mean by an edge coloring.

Find a minimal (minimal number of days) schedule for a 4-person tournament and for 5-person tournament; explain in each case why fewer days will not suffice.