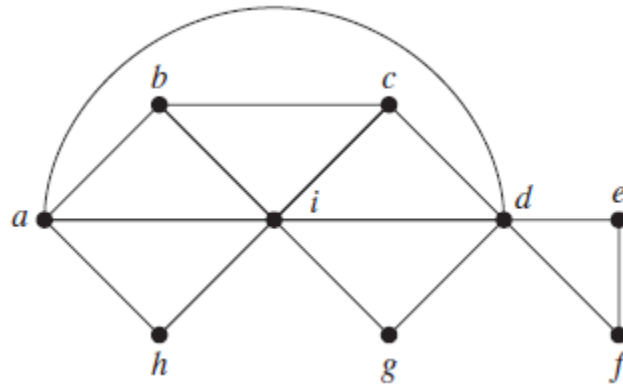# Discrete Mathematical Structures (UCS 405)

Tutorial Sheet – 10

1. Determine whether the given graph has an Euler circuit. Construct such a circuit when one exists. If no Euler circuit exists, determine whether the graph has an Euler path and construct such a path if one exists.


2. Determine whether the given graph has a Hamilton circuit. Construct such a circuit when one exists. If no Hamilton circuit exists, determine whether the graph has a Hamilton path and construct such a path if one exists.
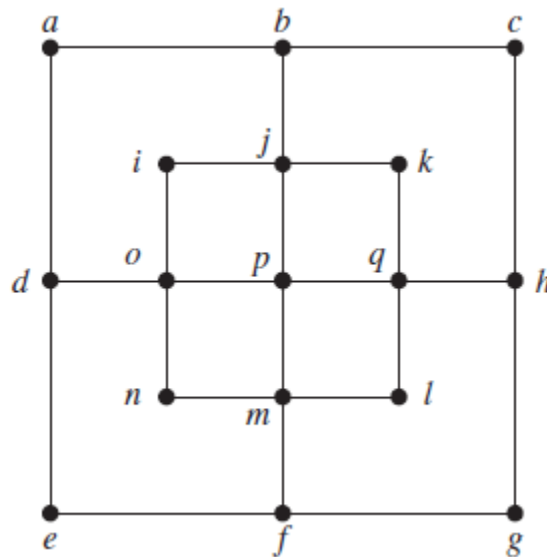

3. Suppose that in addition to the seven bridges of Königsberg (shown in Figure below) there were two additional bridges, connecting regions B and C and regions B and D, respectively. Could someone cross all nine of these bridges exactly once and return to the starting point?
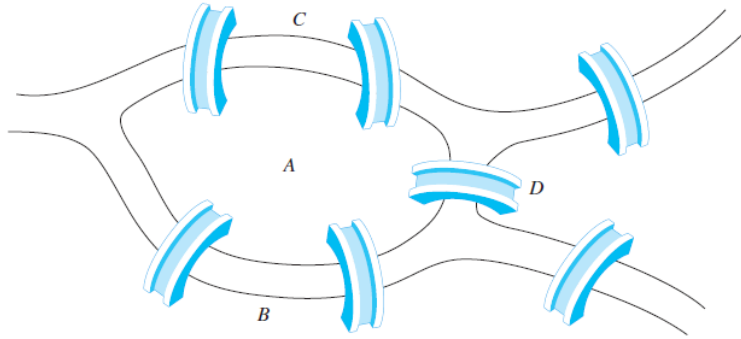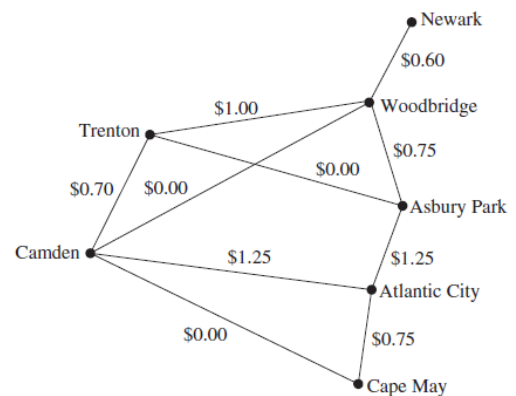
4. Find the shortest path and its length from a to z in the given weighted graph.
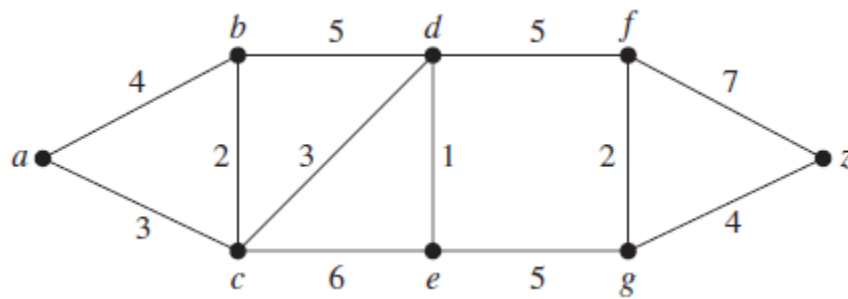
5. The weighted graphs in the figures here show some major roads in New Jersey. Part (a) shows the distances between cities on these roads; part (b) shows the tolls.
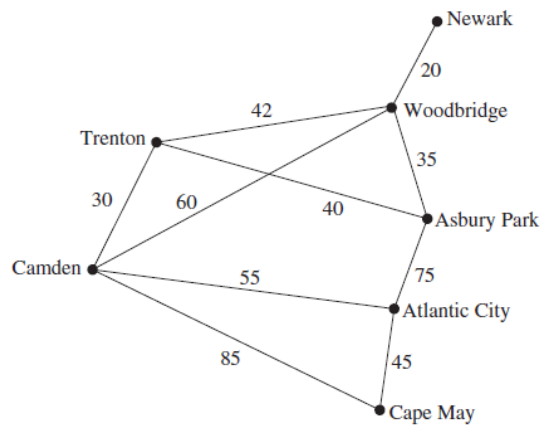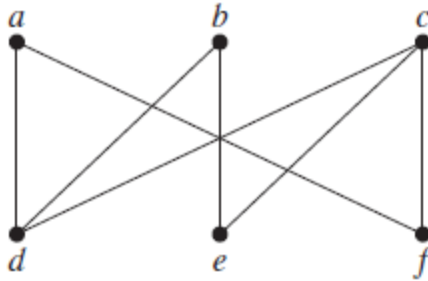

(a)   (b)

a) Find a shortest route in distance between Newark and Camden, and between Newark and Cape May, using these roads.

b) Find a least expensive route in terms of total tolls using the roads in the graph between the pairs of cities in part (a) of this exercise.

6. Determine whether the given graph is planar. If so, draw it so that no edges cross.

7. Suppose that a connected planar graph has eight vertices, each of degree three. Into how many regions is the plane divided by a planar representation of this graph?

8. How many different channels are needed for six stations located at the distances shown in the table, if two stations cannot use the same channel when they are within 150 miles of each other?

	1	2	3	4	5	6
1	—	85	175	200	50	100
2	85	—	125	175	100	160
3	175	125	—	100	200	250
4	200	175	100	—	210	220
5	50	100	200	210	—	100
6	100	160	250	220	100	—