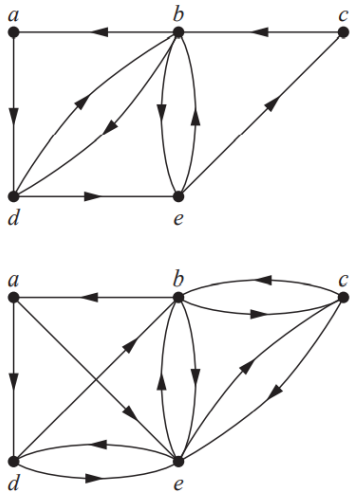
Indian Institute of Information Technology-Vadodara
MA 102: Introduction to Discrete Mathematics
Tutorial 11

1. Suppose that a connected planar simple graph has 20 vertices, each of degree 3. Into how many regions does a representation of this planar graph split the plane?

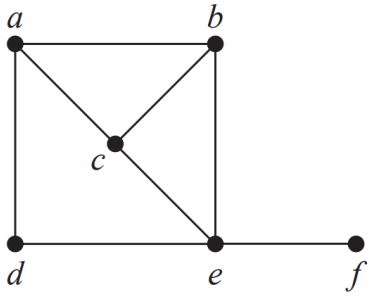
2. Can five houses be connected to two utilities without connections crossing?

3. What are the chromatic numbers of K_n, C_n, W_n?

4. Does following directed graphs have Euler circuit? If yes then find it else give justification. Find conditions for existence of Euler circuit in a directed graph with no isolated vertex.

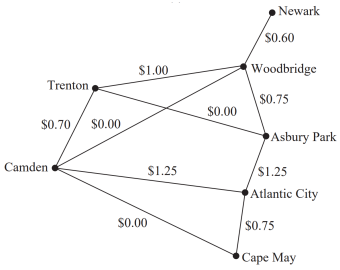


5. Determine whether the given graph has a Hamilton circuit or path.

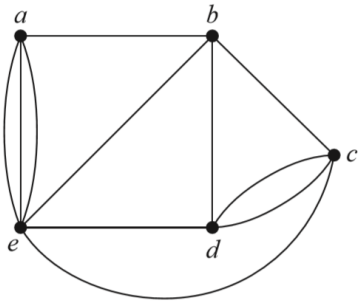


6. For which values of m and n does the complete bipartite graph $K_{m,n}$ have an a) Euler circuit? b) Euler path?

7. Find a shortest route in distance between Newark and Camden, and between Newark and Cape May, using Dijkstra's algorithm. Write down each iteration while implementing the algorithm



8. Can you draw following graph without lifting your pen and without tracing an edge twice? If yes then draw it. Did you stop at a vertex where your started it?



9. An edge coloring of a graph is an assignment of colors to edges so that edges incident with a common vertex are assigned different colors. The edge chromatic number of a graph is the smallest number of colors that can be used in an edge coloring of the graph. What is the edge chromatic number of the graph given in previous question?

10. Represent following map of Gujarat using a graph. How many minimum colours are required to paint it so that adjacent districts have different colours?