Tutorial 13

1. Let G be a simple graph. Show that the relation R on the set of vertices of G such that uRv if and only if there is an edge associated to {u,v} is a symmetric, irreflexive relation on G .

2. How many edges are there in a graph with 10 vertices each of degree six?

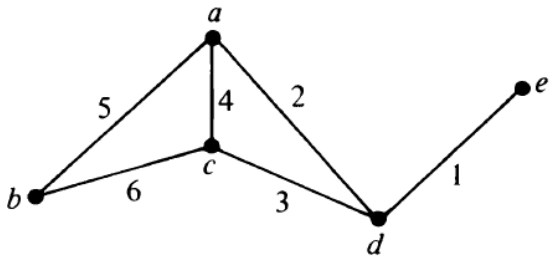
3. Which of the following statements is/are TRUE for an undirected graph?
   P: Number of odd degree vertices is even
   Q: Sum of degrees of all vertices is even
   (A) P Only
   (B) Q Only
   (C) Both P and Q
   (D) Neither P nor Q

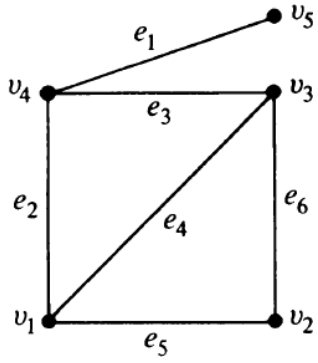
4. Prove that the sum of the degrees of the vertices of any finite graph is even.

5. Show that any graph where the degree of every vertex is even has an Eulerian cycle. Show that if there are exactly two vertices a and b of odd degree, there is an Eulerian path from a to b. Show that if there are more than two vertices of odd degree, it is impossible to construct an Eulerian path.

6. An n-cube is a cube in n dimensions. A cube in one dimension is a line segment; in two dimensions, it's a square, in three, a normal cube, and in general, to go to the next dimension, a copy of the cube is made and all corresponding vertices are connected. If we consider the cube to be composed of the vertices and edges only, show that every n-cube has a Hamiltonian circuit.

7. Show that following graphs are isomorphic:





8. Draw an undirected graph represented by the given adjacency matrix.