Combinatorics Homework

Homework Due on March 05, 2015

Do the following problems and, of course, give explanation when needed.

1. In class we started to find all unlabeled graphs with 4 vertices. In this problem we finish that process.
   (a) For $e = 3, 4, 5, 6$
      i. Draw every unlabeled graph with e edges.
      ii. For each determine how many labeled graphs there are of that type.
      iii. Make sure that is the right number of labeled graphs with e edges.
   (b) How many unlabeled graphs are there with 4 vertices?
2. Let G be a graph. Prove that the edges of G can be directed in such a way the corresponding directed graph contains no closed paths.
3. Prove or give a counter example. If a graph has a closed Eulerian path then it must have an even number of edges.
4. Let G be a simple graph with 10 vertices and 28 edges. Prove G contains a closed path.
5. Find two graphs that have the same order degree sequences (that is take all the degrees of the vertices and put them in order) but are not isomorphic.