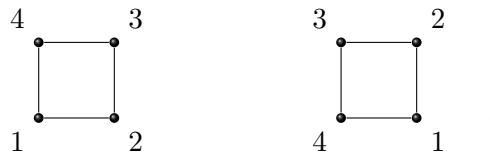


MATH 113: DISCRETE STRUCTURES
HOMEWORK DUE FRIDAY WEEK 7

Problem 1. How many graphs are there with vertex set $\{1, \dots, 100\}$? Graphs are considered to be equal if they have the same edge sets. For instance, consider the case of graphs on the vertex set $\{1, \dots, 4\}$. The following two graphs are different (e.g., the first has edge $\{1, 4\}$ and the second does not):



and the following are the same:



Also, for instance, the graph with no edges (consisting solely of isolated vertices) is a graph. Each edge contains two vertices (no loops).

Problem 2. At every party, one can find two people who know the same number of other people at the party. (The property of “knowing” someone is assumed to be a symmetric relation but not reflexive.) Restate this assertion as a question about graphs, and prove it. [Hint: if there are n vertices in a graph, what is the list of possible vertex degrees? Use the pigeonhole principle.]