MATH 113: DISCRETE STRUCTURES
HOMEWORK 15

Due: Wednesday, March 4 at 10pm.

This is homework on the content covered Monday of Week 6.

Problem 1. How many graphs are there with vertex set $\{1, \ldots, 50\}$? Graphs are considered to be equal if they have the same edge sets. For instance, consider the case of graphs on the vertex set $\{1, \ldots, 4\}$. 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:
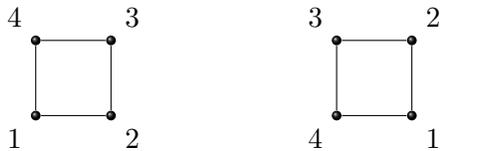
For this problem, we assume our graphs have no loops or multiple edges (i.e., each edge contains exactly two vertices). Also, note that the graph with no edges (consisting solely of isolated vertices) counts as a graph.

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?]