Attempt all of the problems that seem interesting, and let me know if you see any typos! (+) problems are harder than the others. (++) problems are currently open.

1. Prove the properties of a probability space that we mentioned in class.

2. In class, we discussed the Bertrand paradox; specifically, depending on how you defined "random," we showed that the probability of picking a "random" chord in a circle with length greater than $\sqrt{3}$ was $\frac{1}{2}$ or $\frac{1}{3}$. Create a third interpretation of "random" that gives a third, different probability.

3. How many distinct labeled triangles are subgraphs of K_n, for any value of n?

4. Prove the claim we made in class: that there are no 4-cycles that are subgraphs of the Petersen graph. Do this specifically by using the adjacency matrix.

5. How many distinct labeled 5-cycles are subgraphs of the Petersen graph?