Math 342 — Counting II

Problem 1. An urn contains 20 balls; 10 are green, 6 are white, and 4 are red. Suppose we draw 7 balls at random, without replacement. Find the probability of each of the following events.

    a. We choose exactly 4 green balls.

    b. We choose 4 green balls and 3 white balls.

    c. We choose 2 green, 3 white, and 2 red balls.

Problem 2. Consider tossing a coin 6 times. Use binomial coefficients to express the number of outcomes in each of the following events.

    a. Exactly 3 of the flips is heads.

    b. Exactly 2 of the flips is heads.

    c. Exactly 1 of the flips is heads.

    d. There are no heads.

Problem 3. We choose 5 cards from the standard deck of cards. Find the probability of each of the following events.

    a. Our draw contains exactly one ace. *Note that a deck of 52 cards contains 4 aces.*

    b. Our draw contains at least one ace.

    c. Our draw contains exactly 2 aces.

Problem 4. A committee of 7 is to be chosen at random from a group of 5 Republicans, 6 Democrats, and 4 Independents.Find the probability that the committee contains:

    a. 2 Republicans, 2 Democrats, and 3 Independents.

    b. at least 2 independents.

Problem 5. Alice, Bob, and 7 friends will go on a canoe trip. They'll have 3 canoes that hold 2, 3 and 4 people respectively, and will divide themselves randomly with every arrangement equally likely. What is the probability Alice and Bob are on the same canoe? *(Can you break this down by thinking about the probability they're on the same 4 person canoe, the same 3 person canoe, and the same 2 person canoe separately?)*