Mth 21, Homework 6 on section 3.4

Due by Wed, Nov 12.

Section 3.4 Combinatorics and probability

(1) Find the probability that in a group of 7 random people, 2 have the same birthday. Use these steps:

- **(a)** The experiment is asking 7 people their birthdays. For example, the first person can have 365 possible birthdays. Find $n(S)$, the size of the sample space of possible answers.
- **(b)** Let E be the event that 2 or more share the same birthday. Let E' be the complementary event that all 7 have different birthdays. Compute $n(E')$ using the counting principle.
- **(c)** Find $p(E')$.
- **(d)** Find $p(E)$, which is the answer we are looking for.

(Hint: you should get $p(E)$ close to 5%.)

(2) Suppose you are in a group of 13 people. If 4 people are picked at random, what is the probability you are picked? Use these steps:

- **(a)** To get $n(S)$ count the number of ways to choose 4 from 13. Order is not important so use combinations.
- **(b)** Let E be the event that you are picked. Explain why $n(E) = 1 \cdot {}_{12}C_3$
- **(c)** Give the answer as a simplified fraction.

(3) A lottery uses numbers 1 to 50. In the weekly draw, six numbers are picked.

- **(a)** Find the probability that the six numbers on your ticket match and you win the grand prize. Order is not important.
- **(b)** Find the probability that five of your numbers match.

(4) Suppose you are dealt 4 cards from the pack of 52. The order is not important. How many 4 card combinations are possible?

(Hint: it's more than $200\,000$.)

(5) You are dealt a five card poker hand. What is the probability of getting the 2, 3, 4, 5 and 6 of clubs? Write your answer as a decimal and an approximate fraction like $1/10000$.

(6) You are dealt a five card poker hand. What is the probability of getting any five clubs? Write your answer as a decimal and an approximate fraction.

If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes and section in the textbook.
- Check if you get the right answer for a similar odd-numbered question in the textbook (answers at the back of the book).
- Ask me about it after class.
- Come to my office hours: Mon 11:30 - 12:30, Wed 11:30 - 12:30 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.