Exam 1

- When: Friday, February 11 in class.

- What to bring: you may bring a calculator (no phones/laptops etc) and one 8.5 x 11 sheet of paper (both sides are fine, but it must be handwritten)

- Covers: Sections 4.1-4.6, 4.8, 5.1-5.2 in textbook

- Review: you should look at the sections from the book, your homework, and the notes/examples from class

- The exam will be $\sim$6 short answer questions (with multiple parts), equally weighted. There will be one bonus question.

Questions/things to guide you. This is only a rough listing of possible topics:

1. Know about experiments: sample space, event, simple event (aka outcome, observation). What does it mean to be mutually exclusive? What is the probability of an event? Of an outcome?

2. Know how/when to make tree diagrams. What is the union of two events? Intersection? Complement? Can you translate between English and union-intersection notation? Know how to calculate $P(A \cup B)$ and $P(A^c)$. Know also how to calculate $P(A \cap B)$ in terms of $P(A), P(B)$, and $P(A \cup B)$, as well as $P(A \cap B) = P(A)P(B|A)$ or $P(A \cap B) = P(B)P(A|B)$.

3. Know how to work with equiprobable spaces - mn rule, extended mn rule, permutations/combinations (order mattering/not mattering). Know how to apply counting techniques to give you probabilities in equiprobable spaces.

4. What is conditional probability? Can you calculate $P(A|B)$? What does it mean for two events to be independent? How can you test whether two events are independent or not? If you are told two events are independent, how do you calculate $P(A \cap B)$? How can you tell if two events are mutually exclusive?

5. What is a random variable? What is a probability distribution? Given an experiment and a random variable, can you calculate the probability distribution for it? What is the expected value of a random variable? How do you calculate it? What does it mean? Is it possible for a random variable to never equal its expected value? What is $\sigma^2 = Var(x)$? How do you calculate it? Same with standard deviation.

6. Know when an experiment is a binomial experiment (or when, by our rule of thumb, we assume that it is a binomial experiment) with parameters n and p (n = number of trials, p = probability of success, where x counts the number of successes). Be able to calculate binomial probabilities and cumulative binomial probabilities (from the table in the book). Know the expected value/variance/standard deviation for a binomial random variable.