

Exam 2 — Review

- When: Wednesday, March 9 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 5.3, 6.1-6.4, 7.1-7.6 in textbook (you should know a few basics from exam 1, as noted below)
- Review: you should look at the sections from the book, your homework, and the notes/examples from class
- The exam will be ~ 6 short answer questions (with multiple parts).

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

1. (From last exam) Know about binomial experiments (since we approximate these with other distributions). Know how to calculate a mean and variance/standard deviation for a discrete random variable.
2. Know about the Poisson probability distribution and its mean/variance/standard deviation. Be able to calculate Poisson probabilities. Know when a Poisson distribution is a good approximation for a binomial distribution, and how to use the Poisson as an approximation to the binomial.
3. Know what a continuous random variable is and how they compare with discrete random variables. Know what a probability density function is, and how integrals (area under a curve) allow you to calculate probabilities. How, in general, do we find the expected value and variance of a continuous RV given its probability density function? Be able to find the probability density function for a uniform random variable, and be able to work with the exponential random variable.
4. Normal distribution: what parameters do we need to describe one? Officially we want to use integrals to calculate probabilities for the normal distribution (but we can't) - we use tables. Know the standardized normal distribution and how to use the table to calculate its values. Know how to standardize any normal random variable to be able to calculate probabilities.
5. Know when you can approximate a binomial distribution with a normal distribution, and how to do this. What is the continuity correction; can you recognize and use it correctly in this setting? If x is binomial, what is the difference between $P(x > a)$ and $P(x \geq a)$, and how does this impact the continuity correction to the approximating normal distribution?
6. What is a random sample? What is a statistic? What is a sampling distribution? What does the Central Limit Theorem say? Know the mean and standard deviation for both variants of the CLT (for \bar{x} , $\sum x_i$). When can you conclude that the sampling distribution of the mean and sum are normal random variables?
7. Know the distribution for \hat{p} and when it can be considered a normal distribution. What are the mean and standard deviation for the sampling distribution of \hat{p} ? What is the Standard Error of a statistic?