MIDTERM REVIEW

What you should be able to do:

Ch 1
- Understand the difference between populations and samples, parameters and statistics, and identify these in the context of answering a scientific question with data.
- Identify data types as qualitative or quantitative, and the different types within those categories.
- Understand the difference between experiments and observational studies (and their limitations)
- Recognize elements of experimental design such as using controls, blinding, randomization, etc.
- Identify a sampling scheme (SRS, systematic, stratified, etc.) from a description.

Ch 2
- Understand what kind of plot to use for different kinds of data.
- Construct and interpret a histogram.
- Describe the shape of a distribution (skew, bimodality, etc.)
- Understand and interpret percentiles.
- Calculate and compare the measures of center:

mean, median, mode.
- Identify when it is most appropriate to use each measure of center, and when it is inappropriate to use the mean.
- Calculate and compare the measures of dispersion: variance, standard deviation, range.
- Understand and interpret a box plot.
- Calculate and interpret a z-score.
- Identify outliers.

Ch 3
- Understand the fundamental definitions of probability.
- Identify mutually exclusive (disjoint) and/or independent events, and use these to simplify calculations.
- Apply the basic rules of probability (complements, addition, multiplication, conditional probability) to solve a problem.
- Calculate probabilities and odds from a contingency table.
- Apply Bayes' theorem to solve for an unknown conditional probability.
- Compare probabilities using relative risk and odds ratios.
- Calculate a rate.

Ch 4
- Identify a valid probability distribution from a description, table, or probability mass function (PMF).
- Plot and interpret a probability mass function.
- Use a probability distribution to calculate the mean and variance of a random variable.
- Know the PMF, mean, variance, and conditions for the binomial distribution.
- Use the binomial PMF to calculate probabilities of events.
- Know the PMF, mean, variance, and conditions for the Poisson distribution.
- Use the Poisson PMF to calculate probabilities of events.

Ch 5
- Understand how a probability is obtained for continuous random variables.
- Identify the most appropriate probability model for a given data scenario.
- Know the mean and variance of the normal distribution.
- Standardize values from a normal distribution (calculate and understand z-scores)
- Use the z-table to calculate normal probabilities and percentiles.

- Find the sampling distribution of the sample mean if the population is normally distributed.
- Use the central limit theorem to find the approximate sampling distribution of the sample mean if the population is not normally distributed.
- Use the sampling distribution of the sample mean (exact or approximate) to calculate probabilities concerning the sample mean.
- Assess whether a data set is approximately normally distributed.