Statistics 10 Review

Midterm 2

*Note: This is a list of **important** topics, but is not exhaustive. Use this list to prioritize your studying, but not to completely exclude topics that aren't on this list!*

While the exam is not technically cumulative, the exam WILL assume you are familiar with everything from Chapters 1-4, and in particular, the review sheet from Midterm 1.

Chapter 4

- Regression
  - $y = mx + b$ and linear models
  - Residuals
  - Line of best fit, least squares
  - Coefficient of determination
  - Slope and correlation
- Pitfalls of regression analysis

Chapter 5

- Probability basics
  - Empirical vs theoretical probability
  - Events, outcomes, sample spaces
  - Complements, OR, AND
  - Three rules of theoretical probability
  - Mutually exclusive
- Conditional probability
  - Know the formulas
  - Independence and conditional probability
  - Bayes' rule
- Independence
  - The product formula
  - Independence and experiments with repeated trials
  - Mutually exclusive, association, and independence
- The law of large numbers

Chapter 6

- Probability models
  - Discrete models

  - Continuous models, area under the curve
- Normal distribution
  - Bell-shaped, unimodal, symmetric
  - Mean and standard deviation of a normal distribution
  - Standard normal

Chapter 7

- How variation arises due to sampling
- Populations vs samples
- Survey terminology
  - Parameters, statistics, estimators, sample size
  - The sampling distribution
- Bias vs unbiased estimators
  - Bias vs precision
  - Measurement bias, sampling bias
- Simple random sampling
- Central Limit Theorem for proportions
  - Three main assumptions
  - Implication for $\widehat{p}$
  - Connection to the empirical rule
- Standard error of $\widehat{p}$
- Confidence intervals (CIs)
  - Margin of error, confidence
  - How to choose margin of error, z
  - Computing CIs

Things to watch out for
* concluding more than you can from the information given
* using more information than is needed
* confusing conditional probability P(A|B) with P(A and B)
* in probability problems: be careful about what is given and what is assumed
* don't assume:
    - P(A|B) = P(B|A)
    - P(A and B) = P(A)P(B) (only if independent)
    - P(A or B) = P(A)+P(B) (only if mutually exclusive)