STA 3032 Exam 2 Topics

Distributions

- Given the general form of a distribution, know how to write the pdf/pmf in a specific case
  - Know how to simplify the Γ function, when input is a natural number: $n \in \mathbb{N}$ implies $\Gamma(n) = (n-1)!$

Sampling Distributions

- Definition of:
  - Random Sample (independent and identically distributed)
  - Statistic
- When $X_1, X_2, \cdots, X_n \sim N(\mu, \sigma^2)$:
  - Distribution of $\bar{X}$, and S^2
- CLT and the distribution of $\bar{X}$ for $X_1, X_2, \cdots, X_n$ following any distribution

Point Estimation

- Method of Moments:
  - Sample moments
  - Expected moments
  - Solve linear systems
- Maximum Likelihood Estimation:
  - Definition of Likelihood
    - This involves knowing how to express the joint pdf of a random sample.
  - How likelihood relates to a random sample
  - Using the derivative to find the MLE
- Bayesian Estimation
  - Definition of posterior, prior, likelihood
    - Again, writing the likelihood involves knowing how to express the joint pdf of a random sample.
  - The posterior is proportional to the likelihood times the prior (Bayes rule)
  - Using familiar distributions to find normalizing constants without integrating
  - Finding the Bayes estimator (expected value of the posterior)

Hypothesis Testing

- Definition of:
  - Hypothesis
  - Test
  - Quantiles
- When to use z or t values
- Hypothesis tests on the sample mean:
  - One sample, σ^2 known
    - Memorize the test statistic
  - One sample, σ^2 unknown
    - Memorize the test statistic
- p-values: know what probabilities you would have to calculate to get a p-value for a certain test. Know how to set up the applicable integral to get that probability.