Exam 2 is structured similarly to Exam 1 and will contain sections involving true or false questions, open-ended conceptual questions, and applications questions. Below is a list of topics that may appear on the exam in order of priority:

Highest Priority:

- Confidence intervals
    - Differences between interval and point estimation
    - Competing goals in interval estimation
    - Definition of "confidence level"
    - How to find the components of the margin of error to produce an interval estimate with a certain confidence level.
    - Factors influencing the width of an interval
- ANOVA
    - Null and alternative models in one-way ANOVA
    - Residuals and why sums of squared residuals summarize model fit
    - Relationships between sums of squared residuals, the F-statistic, and the p-value/conclusion drawn from an ANOVA F-test
- Chi-squared Tests
    - Basic steps of a goodness of fit and test of independence (finding expected counts, calculating the test statistic, comparing to null distribution)
    - How expected counts are determined for each type of Chi-squared test
- Multiple Comparisons
    - Why multiple testing is a problem
    - Differences in Type I error control vs. False Discovery Rate control methods
    - Relationship between significance thresholds (alpha) and Type II error control
- Study Design and Tables
    - When to use an odds ratio or relative risk instead of a difference in proportions
    - How to interpret odds and an odds ratio
    - Basic differences between experimental vs. observational studies
    - Basic differences between types of observational studies (cohort/prospective, retrospective/case-control, cross-sectional)

Medium Priority:

- Confidence Intervals
    - Steps involved in bootstrapping to create a percentile bootstrap confidence interval

    - When to use bootstrapping
    - How to interpret confidence intervals as complimentary to a hypothesis test (ie: contains the null hypothesis -> p-value is larger than 1 – conf level).
- ANOVA
    - Assumptions of one-way ANOVA (similar std devs, Normal residuals) and how to check them (2 x std dev rule of thumb, Q-Q plot).
    - Post-hoc testing and the information it provides
    - Why you might log-transform the outcome
- Chi-squared Tests
    - Standardized residuals and interpreting direction of relationship
    - Sample size assumptions and when to use Fisher's exact test
- Multiple Comparisons
    - How to perform the Bonferroni adjustment to get an adjusted significance threshold or adjusted p-values
- Study Design and Tables
    - How to calculate an odds ratio from a two-way frequency table.
    - Why relative risk and differences in proportions don't work for case-control retrospective studies

Low Priority:

- Confidence Intervals
    - R functions used to create confidence intervals
    - Sample size assumptions required valid confidence intervals in various scenarios
- ANOVA
    - Relationships between quantities in an ANOVA table (ie: MSG = SSG/df1)
    - How to interpret log-transformed outcomes
- Chi-squared Tests
    - Relationship between Chi-squared test and Z-test
- Multiple Comparisons
    - How the probability of at least one Type I error is calculated
- Study Design and Tables
    - Relative strengths of various study designs (experimental > prospective > retrospective > cross-sectional)