Chapter 1: Students should be able to:

- ☐ Identify and label different types of variables (numerical, categorical, discrete, etc).
- ☐ Determine when two variables are dependent or independent and explain how they can tell.
- ☐ Identify different types of bias in given research problems.
- ☐ Correctly label and identify explanatory and response variables is a study.
- ☐ Distinguish between observational studies and experiments.
- ☐ Understand the difference between correlation and causation and what types of studies establish each.
- ☐ Identify in what circumstances it would be better to use different types of sampling methods (simple random, stratified, cluster).
- ☐ Explain why random sampling is important to statistics.
- ☐ Describe distributions of data, including modality and skewness.
- ☐ Calculate center points of distributions with a mean or median.
- ☐ Understand and interpret ways to talk about spread such as standard deviation and IQR. I will not ask you to calculate these by hand on a test though.
- ☐ Interpret histograms and boxplots and use them to compare or reason about the distribution of some variable.
- ☐ Identify in what distributions it is more robust to talk about median and IQR instead of mean and standard deviation
- ☐ Interpret barplots and mosaic plots to understand ratios of categorical variables.

Chapter 5: Students should be able to:

- ☐ Estimate correlation coefficients from scatterplot data.
- ☐ Calculate a residual given a fit linear model.
- ☐ Identify the different pieces of a linear model and what they correspond to on a scatterplot. *I will not ask you to calculate the slopes and intercepts by hand.*
- ☐ Check the necessary conditions given the needed plots to ensure that it was safe and proper to apply a least-squares fit line to some data. Identify what condition fails if necessary.
- ☐ Interpret conceptually what R^2 tells about about a fitted linear model
- ☐ Interpret a fit summary from R and identify needed model parameters.
- ☐ Identify and label different types of outliers.
- ☐ Utilize a fit linear model to make predictions about a dataset.

Chapter 6: Students should be able to:

- ☐ Interpret a multiple regression fit summary from R and identify needed model parameters.
- ☐ Utilize a fit model to make predictions about a dataset.
- ☐ Interpret and explain what the different model parameters mean in the context of multiple regression.
- ☐ Understand how Adjusted R^2 differs from the classic R^2 and why a difference exists. I will not ask you to calculate Adjusted R^2.
- ☐ Identify the necessary conditions for a multiple regression fit to be valid, and be able to use supplied plots to check those conditions. Identify what condition fails if necessary.
- ☐ Use fit summaries from R to compare the effectiveness of different models.

Appendix: Students should be able to:

- ☐ Understand the correct way to interpret the Law of Large Numbers and not fall victim to the gambler's fallacy.
- ☐ Calculate the probability of multiple disjoint or non-disjoint events
- ☐ Interpret Venn diagrams to understand ratios and probabilities of categorical data.
- ☐ Interpret probability distributions and be able to identify when they are flawed.
- ☐ Recognize when two events are complementary.
- ☐ Calculate the combined probability of multiple independent events
- ☐ Calculate conditional probabilities given a table or individual probabilities.
- ☐ Construct tree diagrams to interpret and calculate new conditional probabilities.