Midterm Exam 1 Prep

Midterm Exam 1 will be held on **Thursday, February 12** during class, and will cover all material from Module 1 (Topics 1-7). This will be a **closed-book exam** - no cell phones, tablets, laptops, or internet-accessing devices of any kind will be permitted during the exam. However, you may make and bring a **handwritten, single-sided** "cheat sheet" on a 8.5x11 piece of paper. A calculator may be used for arithmetic computations, but nothing more complex than a scientific calculator will be needed for the exam, and you are not permitted to use a calculator capable of storing extensive notes or accessing the internet (such as a TI-NSpire).

The exam will be graded out of **100 points**, and each question will be labelled with its point value. Approximately 70-80% of the exam points will be some variety of multiple-choice question - this may include true/false questions, matching questions, or "choose all that apply" questions. The remaining 20-30% of the exam will be open-ended and may require you to explain your reasoning or show calculation work to support and justify your answers. During grading, partial credit will be given wherever possible; for example, single-answer multiple choice questions will not be eligible for partial credit, but "choose all that apply" questions will have a partial credit structure, and the open-ended portion of the exam will grant partial credit for work shown.

Possible Material - THIS LIST MAY NOT BE EXHAUSTIVE (although it's certainly trying to be)

Topic 1 - types of variables, explanatory vs response, describing relationships of variables

Topic 2 - data sources, observational studies vs experiments and their conclusions, confounding variables, population vs sample, sampling strategies, types and sources of sampling bias

Topic 3 - principles of experimental design, placebos and blinding strategies, observational studies vs experiments and their conclusions

Topic 4 - histograms vs boxplots, how to construct various plots, describing distributions, measures of center (mean, median, mode), measures of spread (variance, standard deviation, IQR, 5-number summaries), outliers on various plots

Topic 5 - contingency tables, bar charts, side-by-side plots

Topic 6 - correlation, main properties, computation, effects of outliers

Topic 7 - goals of least-squares regression, computing a regression line, computing and interpreting residuals, correlation and regression, limitations, understanding residual plots

Practice Problems

Past exam problems - **STOR_155_Midterm_Exam_1_v1.pdf** (https://uncch.instructure.com/courses/114835/files/13870560?wrap=1) (https://uncch.instructure.com/courses/114835/files/13870560/download?download_frd=1) (https://uncch.instructure.com/courses/94746/files/12432115/download?download_frd=1)

Past exam solutions - **STOR_155_Midterm_Exam_1_v1_solutions.pdf** (https://uncch.instructure.com/courses/114835/files/14289154?wrap=1) (https://uncch.instructure.com/courses/114835/files/14289154/download?download_frd=1)

DISCLAIMER: Please note that the format of this old exam does NOT match our exam format for this semester. This exam was fully open-ended and took far too long to grade, hence the change in format this semester. These practice problems are intended to give you some idea of how I write questions and how various concepts may be represented in exam problems.

Additional Resources

Textbook - Our textbook is open-source and available for free, and is posted on Canvas. Throughout each section, there are worked examples (which **explain a problem** from start to finish) and guided practice problems (for which the explanations are **hidden in the footnotes** so you can avoid them until you want to check your work) on the section material. In addition, at the end of each section are exercises dedicated to the section, and at the end of each chapter are exercises that synthesize all the material from the chapter. The answers for all **odd-numbered exercises** are at the back of the book - these don't often include detailed explanations, but you can at least check your results.

Textbook website - The textbook's accompanying website, **https://www.openintro.org/book/os/** (https://www.openintro.org/book/os/), provides notes, slides, and even some exercises and practice problems to accompany the book. I've been building my own notes and slides, so these alternative notes may provide a slightly different perspective on the material that could be helpful to you.

YouTube channels - There are LOTS of content creators who make videos on topics relevant to this course. **Khan Academy** (https://www.youtube.com/channel/UCRXuOXLW3LcQLWvxbZiIZ0w) is well-known for lots of math courses and is excellent here. **StatQuest with Josh Starmer** (https://www.youtube.com/@statquest) and **ZedStatistics** (https://www.youtube.com/@zedstatistics) are a bit more advanced but do a solid job covering the fundamentals; plus, StatQuest was founded by a former UNC faculty member! I strongly encourage you to seek out your own favorite stats-content creators on YouTube as well (and share them on Piazza so others can benefit). As a general rule of thumb, if a content creator starts throwing around words that sound completely unfamiliar, you should assume that they are talking about something more advanced than we have covered so far, NOT that you've completely lost track of how everything works.