Material Covered

Test 1 covers Sections 2.1–2.6 plus the material from the appendices and Chapter 1 that we have used (sets, sums, a bit of R, etc.)

Note that there is a summary at the end of each chapter that briefly reviews the most important topics of the chapter. **The summary at the end of chapter 2 makes a good list of things to know**. Just keep in mind that section 2.7 will not be on the test, so you don't need to know about things like Poisson distributions, Hypergeometric distributions, and Fisher's exact test.

You can also consult the **course calendar** to remind yourself what topics we covered each day.

Format

The test will include both an in-class portion and a take-home portion. You may use RStudio (so bring your laptop to the in-class portion). Both portions are to be done with out assistance from other people or the internet (except for your use of RStudio). For the take-home portion only you may additionally consult your notes and textbook.

Sometimes I leave room on the test paper for your work. Sometimes I print the exam problems without allowing room for your work. In the latter case, you will be given blank paper to do you work on. This allows you to use the amount of space you need for each problem, but requires that you do some things to help me out:

- Put your name on each sheet (just in case).
- Clearly label each problem, and leave some space between problems. **Do not work in two columns.**
- **Leave margins around your work!** I'll three-hole punch the paper to encourage you to leave a margin the left side. Make sure you also begin far enough down that page that the staple doesn't make part of you work impossible to read.
- You may put more than one problem on a page, but **your work must be in order** at the end.
- **Don't start new problems on the bottom quarter of the page.**

Some Additional Comments

- Be sure to look over your old homework so you can fix any problems detected there. The extra problems (bracketed) can be used for additional practice if you like.
- You should be able to do the following in R:
  - Do probability calculations for the distributions we have seen (or any others that work similarly) using functions like `dbinom()`, `pbinom()`, and `qbinom()`, etc.
  - Create and manipulate simple vectors (e.g. `x <- 0:10; y <- c(1, 3, 4, 7)`), and do basic arithmetic using functions including `sum()`, `prod()`, `mean()`, `choose()`, `factorial()`, etc.
  - Make basic plots (especially using `gf_dist()`, `gf_point()`, `gf_line()`, and `gf_histogram()`)
- **No mystery numbers allowed.** It should be clear where every number comes from.
  - If you use a calculator or computer to get a number, it must be clear from the work on your paper how someone else could get that number. (Write down the R code, for example.)
  - When doing combinatorics problems, make it clear where the component numbers are coming from.
  - Round as late as possible. **Keep at least three significant digits.** (Leading 0's are not significant digits.)

- Use **notation** well.
  - You are required to understand and use the notation we have introduced in class. This includes correct use of the equals sign (=).
  - If you received a "notation" comment on a problem set, be sure you understand it.
  - You may invent notation as long as you explain it.
- Don't be afraid to **use words**.

  In any case, do your work in "paragraph order" (left to right, top to bottom).
- When doing probability problems be sure to identify the events and random variables involved.

  For working with random variables, for example, it is often good to have statements like each of the following examples as part of your solution:
  - Let X = the number of free throws Freddie makes.
    (Describe the random variable in words.)
  - Then $X \sim \mathsf{Binom}(20, 0.8)$.
    (Specify the particular distribution of the random variable if it is one of our familiar examples.)
  - $\mathrm{P}(X \geq 16) = 1 - \mathrm{P}(X \leq 15) =$`1 - pbinom(15, 20, .8)` $= 0.6296$
    (Identify the probability you are calculating and the R code used to get it.)

  A similar approach should be used for other probability problems as well. This approach will help you think clearly and avoid errors. It will also help me grade your work.
- **Don't neglect the "easy stuff".**

  Some of the counting and probability problems are challenging and require combining several ideas in order to get to a solution. Don't let the fact that some of these are challenging make you forget about easier things.
  - If a situation is binomial or negative binomial you should recognize this and make use of what we have learned about these distributions (and R to do calculations). Be sure you know when the situations apply and how to use `dbinom()`, `pbinom()`, and `qbinom()` (and their cousins for the other distributions).
  - Be sure you are solid on all the basic definitions and probability rules (intersection, union, complement, conditional probability, independence, mean, variance, standard deviation, etc.)
- Maintain **balance between "big picture" and details.**

  You should know both, so don't neglect one in favor of the other. You should know both how to calculate a conditional probability and what a conditional probability means. (You can replace conditional probability with several other terms, like pmf, cdf, independence, etc.)

  As you work problems or look back over your assignments, ask yourself what was important about that assignment. Pay careful attention to things we have used repeatedly or that seem especially important (or for which we have call-and-response slogans).