I. **Sections to Read** (All content from DeGroot and Schervish's *Probability and Statistics* unless otherwise noted) A digital copy of the textbook is available for on our class PWeb site, under the Day One Access tab.

(a) Reread Section 7.2 (This section is dense, and worth revisiting)

(b) In the next few days, we'll be working closely with Beta, Gamma, and Normal distributions, and so its worthwhile to remind ourselves of features of these distributions from STA 335. To do so, review one of the following:

- **Option 1**: Sections 5.4, 8.3, 8.4 and 8.5 from Blitzstein's *Introduction to Probability*
  Digital copy: `www.probabilitybook.net`;
- **Option 2**: Sections 5.6, 5.7 and 5.8 from DeGroot's *Probability and Statistics*.

II. **Objectives** (By the end of the day's class, students should be able to do the following:)

- Identify the formulas for the PDFS of Normal, Beta, and Gamma distributions.
- Define the Gamma function and explain how it is used in the PDFs of the Beta and Gamma distributions.
- Solve integrals involving the Beta and Gamma PDFs without using technology or calculation, by appealing to known formulas for PDFs.
- Describe common stories where Beta, Gamma, and Normal random variables appear.
- Explain why the exponential distribution is a special case of the Gamma distribution, and why the Uniform distribution is a special case of the Beta distribution.

III. **Reflection Questions** (Submit answers on Gradescope `https://www.gradescope.com`)

1) Suppose x is a non-negative real number and that you learn that the density function of a random variable Y is equal to the function $f(y) = c \cdot y^x(1-y)^2$ for $y \in (0,1)$, where c is a constant that depends on x but not on y. Explain how you can deduce that Y has the Beta$(x+1, 3)$ distribution (and can do so without actually calculating the value of c).

2) Evaluate the following integrals using the technique of pattern recognition (that is, don't use technology or calculus to evaluate, and instead, compare to integrals involving known PDFs of random variables):

i. $\displaystyle\int_0^1 x^2(1-x)^3\,dx$

ii. $\displaystyle\int_{-\infty}^{\infty} e^{-4x^2}\,dx$

iii. $\displaystyle\int_0^{\infty} 5x^{100}e^{-2x}\,dx$

IV. **Additional Feedback** Are there any topics you would like further clarification about? Do you have any additional questions based on the readings / videos? *If not, you may leave this section blank.*