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) Section 9.6 and 9.7 (skim 9.6 and focus on 9.7)

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

- Generalize the t-test procedures to the case where samples are obtained from two Normally distributed populations
- Demonstrate that the standardized test statistic for difference in means has the t-distribution, when the samples are obtained from two populations with equal variance.
- Determine the power of the t-test for particular values of the parameters μ_1, μ_2, σ^2.
- Define the F-distribution as the ratio of two independent variables.
- Perform an F-test procedure for comparing the variances of two Normal distributions.
- Use R to calculate the p-value of a sample used for an F-test.

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

1) Section 9.6 outlines a t-test procedure for assessing whether the means of two Normal populations are equal. In order to perform this test, we need to make an important assumption about the variances of these distributions. Describe how we can use the methods described in Section 9.7 to assess whether this assumption is justified.

2) Suppose we have a sample $\mathbf{X}$ of size m from $N(\mu_1, \sigma_1^2)$ and a sample $\mathbf{Y}$ of size n from $N(\mu_2, \sigma_2^2)$ and wish to test the hypotheses

$$H_0 : \sigma_1^2 = \sigma_2^2 \qquad H_1 : \sigma_1^2 \neq \sigma_2^2$$

using the test statistic

$$V = \frac{S_X^2/(m-1)}{S_Y^2/(n-1)}$$

described in Equation 9.7.4 on p 599. Give an intuitive explanation (i.e. without referencing any particular distribution) why values of V that are very close 0 or that are much larger than 1, give good evidence against H_0.

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.*