I. **Pre-class material** Either read the indicated textbook sections OR watch the indicated video.

(a) **Sections to Read** (All content from Blitzstein and Hwang's *Introduction to Probability* unless otherwise noted). A digital copy of the textbook is available for free via the authors' website.

- 7.5, 7.7

(b) **Videos to Watch** (All videos from Blitzstein's Math 110 YouTube channel, unless otherwise noted)

- Lecture 30: Chi-Square, Student-t, Multivariate Normal (from 28:00 to end)
- Read Section 7.7 (R code for the multivariate Normal is not described in the lecture video)

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

- State the definition of the multivariate Normal distribution
- List possible 'distribution-preserving' transformations of the multivariate Normal distribution.
- Calculate the moment generating function of the multivariate Normal.
- Describe how to obtain a bivariate Normal of any desired correlation from a pair of independent Normal random variables.

III. **Reflection Questions** (Submit answers on Gradescope `https://www.gradescope.com/courses/425901`)

1) True or False? If X and Y each have marginal distribution $N(0,1)$, then X and Y are multivariate Normal.
2) True or False? If X and Y are bivariate Normal, then each of X and Y have marginal distributions which are Normal.
3) True or False? If (X,Y) is a bivariate normal and $\text{Cov}(X,Y) = 0$, then the joint density of (X,Y) factors as the product of the marginal densities.
4) Suppose X and Y are iid $N(0,1)$ and let $Z = X$ and $W = aX + bY$. Find values of a and b so that $\text{Corr}(W,Z) = 0.5$.

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.*