# Pre-class preparation

Please read the following textbook sections from Blitzstein and Hwang's *Introduction to Probability* (second edition) OR watched the indicated video from Blitzstein's Math 110 YouTube channel:

- Textbook: Sections 5.4, 5.9
- Video:
  1. Lecture 13: Normal Distribution (from 23:00 to end)
  2. Lecture 14: Location, Scale, and LOTUS (from beginning to 23:00)
  3. Read Section 5.9 (there is no discussion of R in the video)

# Objectives

By the end of the day's class, students should be able to do the following:

- Give the PDF, CDF and a story description for a Normal distribution.
- Show that the PDF for a standard Normal random variable is valid, and compute the mean and variance for the standard Normal.
- Express the CDF and PDF for a general Normal random variable in terms of the CDF and PDF for the standard Normal random variable.
- Use the $68-95-99.7$ rule to approximate probabilities of Normally distributed random variables.

# Reflection Questions

Please submit your answers to the following questions to the corresponding Canvas assignment by 7:45AM:

1. True or False: The function $\phi(t) = \frac{1}{\sqrt{2\pi}} e^{-t^2/2}$ does not have an antiderivative.
2. Suppose $Z \sim N(0,1)$ and $X \sim N(2,25)$. *Recall that* $X \sim N(a,b)$ *means that* $X$ *has mean* $a$ *and* ***variance*** $b$.
   (a) Use the 68-95-99.7 rule to estimate the value of $P(Z > 2)$ and $P(X > 12)$.
   (b) Use R to find accurate decimal approximations of $P(Z > 2)$ and $P(X > 12)$.
3. For $Z \sim N(\mu, \sigma^2)$, what is the **median** of $Z$ (i.e. the value $M$ so that $P(X < M) = \frac{1}{2}$ )?
4. (Optional) Is there anything from the pre-class preparation that you have questions about? What topics would you like would you like some more clarification on?