

**I. Sections to Read** (All content from Blitzstein and Hwang's *Introduction to Probability* unless otherwise noted)

- 5.5 and 5.6

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

- Lecture 16: The Exponential Distribution
- Lecture 17: Moment Generating Functions (from beginning to 17:00)

**III. Objectives**

- Give the PDF, CDF and a story description for an Exponential distribution.
- Show that the PDF for an exponential random variable is valid, and compute the mean and variance for the exponential variable.
- Prove that the exponential variable is the only continuous variable with the memoryless property.
- Describe the relationship between the exponential and Poisson variable in the context of the Poisson process.

**IV. Quiz Questions** (Submit answers on Gradescope )

- 1) Suppose  $X \sim \text{Exp}(\lambda)$ . Is  $X$  symmetric around 0? Is there any value  $c > 0$  so that  $X$  is symmetric around that value? (i.e. so that  $X$  has the same distribution as  $c - X$ )
- 2) Wait times until objects fail are often represented using exponential variables. Suppose the time  $T$  from purchase until a harddrive fails is approximately exponentially distributed with rate  $\lambda = 2$  years. If you have owned the computer for 1 year already, what is the expected amount of time from now you will need to wait until the harddrive fails? (You should be able to answer without using the PDF of any distributions).