ISyE 6739 Video Assignment 2

January 12, 2018

1. What is a discrete random variable? What is a continuous random variable?

   Answer: A discrete random variable is random variable with a finite (or countably infinite) range. A continuous random variable is random variable with an interval (either finite or infinite) of real numbers for its range.

2. How to calculate the CDF of a discrete random variable x if it takes only non-negative integer values and its PMF is $p(x)$? How to calculate the CDF of a continuous random variable x if its PDF is $f(x)$?

   Answer: Discrete:

   $$F(a) = Pr\{x \leq a\} = \sum_{i=0}^{a} p(i)$$

   where a is non-negative.

   Continuous:

   $$F(a) = Pr\{x \leq a\} = \int_{-\infty}^{a} f(x)dx.$$

3. Write the formula of the r^{th} moment for a random variable x in terms of the expected value.

   Answer:

   $$M_r = \mathrm{E}[x^r]$$

4. Describe the relationship between the Bernoulli and Binomial distributions.

   Answer: The binomial distribution is a finite sum of iid Bernoulli distributed random variables:

   $$X_1, \ldots, X_n \sim Bernoulli(p),$$
   $$X_1 + \ldots + X_n \sim Binomial(n, p).$$