Chapter 7 (Part 2) and Chapter 8

Fred Azizi

2023-11-07

Quick review

Binomial random variable

- The binomial experiment consists of a **fixed number of trials** (n).
- Each trial has **two possible outcomes**: S/F.
- The probability of success is p (**fixed**). The probability of failure is 1-p (fixed).
- The trials are **independent**.
- $P(x) = nCx \;\; p^x(1-p)^{n-x}$.
- $E(x) = np$, $Var(x) = np(1-p)$.

Quick review

The Poisson random variable

- Defined as **number of successes** that occur in a period of time or an interval of space.
- The number of successes that occur in any interval is **independent** of the number of successes that occur in any other interval.
- The probability of a success in an interval is the same for all equal-size intervals.
- The probability of a success in an interval is **proportional to the size of the interval**.
- $P(x) = \frac{e^{-\mu}\mu^x}{x!}$ where μ is the mean number of successes in the interval or region.
- $E(x) = \mu$, $Var(x) = \mu$.

Quick review

Continuous random variable:

- Probability Density Function (PDF)
  - Usually is shown by $f(x)$
  - Whole area under PDF is 1
  - $f(x) \geq 0$.
  - Probability of interval (a, b) with PDF $f(x)$ is the area under PDF from a to b.
- Special case (Uniform RV)
  - Uniform random variable defined on min=a and max=b
  - $f(x) = \frac{1}{b-a}$ when $a \leq x \leq b$
- Special case (Normal RV)
  - Always defined with a mean (μ) and variance (σ^2).
  - For finding probabilities of interval (a, b), we need tables/computer programs