1. Distribution

Definition:

A distribution describes how the values of a random variable are spread or allocated. It gives a complete picture of the probabilities associated with every possible value or range of values the variable can take.

Types:

Probability Distribution Function (PDF) – for discrete random variables (e.g., number of heads in coin tosses).

Cumulative Distribution Function (CDF) – for both discrete and continuous variables.

Probability Density Function (also PDF) – for continuous random variables (see below).

Examples:

Binomial distribution (discrete)

Normal distribution (continuous)

Uniform distribution

◈ 2. Density (Probability Density Function - PDF)

Definition:

For a continuous random variable, the probability density function (PDF) is a function that describes the relative likelihood for the random variable to take on a given value.

. Unlike a probability in discrete cases, the value of the density function is not a probability. The actual probability over an interval is the area under the curve of the density function.

Key Properties:

for all

(total probability)