# Continuous Probability Distribution

Continuous Uniform or Rectangular Distribution

Normal or Gaussian Distribution

# Continuous Uniform or Rectangular Distribution

A continuous random variable $X$ that has the uniform or rectangular distribution over the interval $[a, b]$
denoted by $X$~Uni(a, $b$),
has the probability density function

$$f(x) = \begin{cases} \dfrac{1}{b-a}, & a \leq x \leq b \\ 0, & \text{otherwise:} \end{cases}$$

The mean and variance of $X$ are given by

$$\mu_X = \frac{a+b}{2}$$

$$\sigma_X^z = \frac{(b-a)^2}{12}$$

Example 1. Let $X$ be a continuous random variable with probability density function given by

$$f(x) = \frac{1}{4}, 1 \leq x \leq 5$$

a. Find the mean and variance of $X$.

b. Draw the graph of $f(x)$.

c. Find $P(2 \leq X \leq 3{,}5)$,

Example 2. Gladys, the secretary of a law firm, noticed that the arrival time $X$ of a client within a 30 -minute period has the rectangular distribution. Thus, $X \sim$ Uni(a=0, $b = 30$), with probability density function

$$f(x) = \frac{1}{30}, 0 \leq x \leq 30.$$

a. Find the mean and standard deviation of $X$.

b. What is the probability that a client will arrive during the last ten minutes of a given 30 -minute period?

Continuous random variables could take on any value within a given finite or infinite range of possible values. Their values may be measured to any degree of precision along a continuous scale, but they are usually rounded off to a specified number of decimal places. Even so , these rounded-off values are treated as the values of a continuous random variable since this is their underlying characteristic. Some examples of continuous random variables are height in meters, weight in kilograms, volume in liters, and time in minutes.

Of all the continuous probability distributions, the **normal distribution** is the most important because most of the theories and applications in statistical inference are based on the assumption of normality.