

- **Probability Distribution**

A probability distribution lists all possible outcomes from an experiment and the probability of that outcome.

- **Random Variables**

A random variable is a numeric value that results, by chance, from an experiment.

- **Discrete Random Variable**

A discrete random variable is the result of an experiment that is selected by chance and the value can be counted.

- **Continuous Random Variable**

A continuous variable can assume any value and often results from measurements.

- **Discrete Probability Distributions**

Every possible outcome from an experiment that results in discrete random variables, such as rolling a six-sided die.

- **Expected Value or Mean of a Discrete Probability Distribution**

To compute the mean or expected value of a discrete probability distribution, you multiply each outcome by its probability and sum the results.

$$\mu = \sum(xP(x))$$

- **Variance of a Discrete Probability Distribution**

The formula for computing the variance of a discrete probability distribution is:

$$\sigma^2 = \sum[(x - \mu)^2 P(x)]$$

- **Binomial Probability Distributions**

With binomial probability distributions there are only two possible outcomes.

The Binomial probability formula is: $P(x) = {}_n C_x p^x (1 - p)^{n - x}$

Where

$P(x)$ = the probability of x number of successes

${}_n C_x$ = Combination

p = the probability of a success on each trial

You can also use readily available tables to lookup Binomial probabilities.

- **Mean - Binomial Distribution**

The mean of a binomial distribution is the number of trials multiplied by the probability of success for each trial.

$$\mu = np$$

- **Variance - Binomial Distribution**

The formula to compute the variance of a binomial distribution is:

$$\sigma^2 = np(1 - p)$$

- **Poisson Probability Distributions**

The Poisson distribution relies on a specific interval of time, space, or area. With the Poisson distribution, the probability is determined with the mean number of occurrences. Once the mean is determined, the probability of x successes can be determined using the Poisson distribution formula which is:

$$P(x) = \frac{\mu^x e^{-\mu}}{x!}$$

e is a constant: 2.71828