Summary

Random variables:

A random variable is a defined variable that could take on discrete or continuous values. Discrete values are countable and finite in theory, although sometimes they may not be bounded by an upper or lower bound …eg: number of people on earth. Continuous random variables could take on any real number in an interval... eg: temperature.

Expected Value:

The expected value is the arithmetic mean of the possible values a random variable can take, weighted by the probability of those outcomes.

Calculating Probability

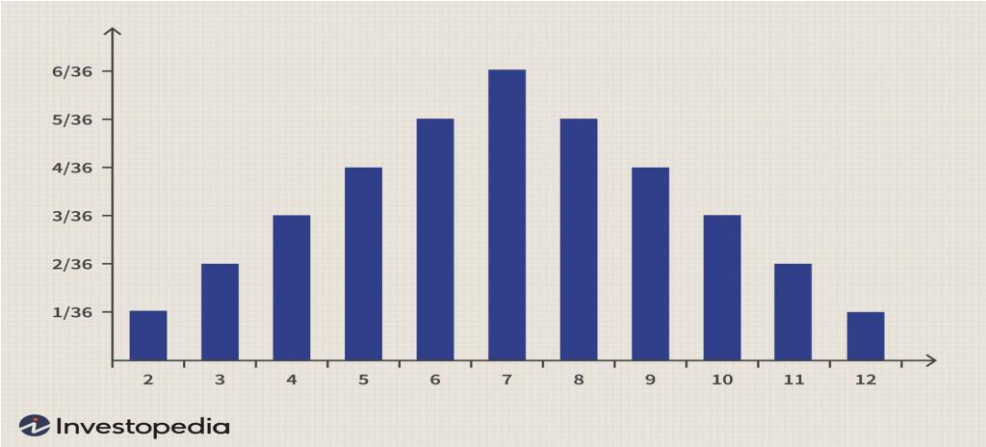
We calculate probability by dividing the number of events where something happens by the total number of events.

Law of large numbers

Law of large numbers states that if you repeat an experiment a large number of times and average out the outcomes obtained from these experiments, what you'll end up with is the expected value.

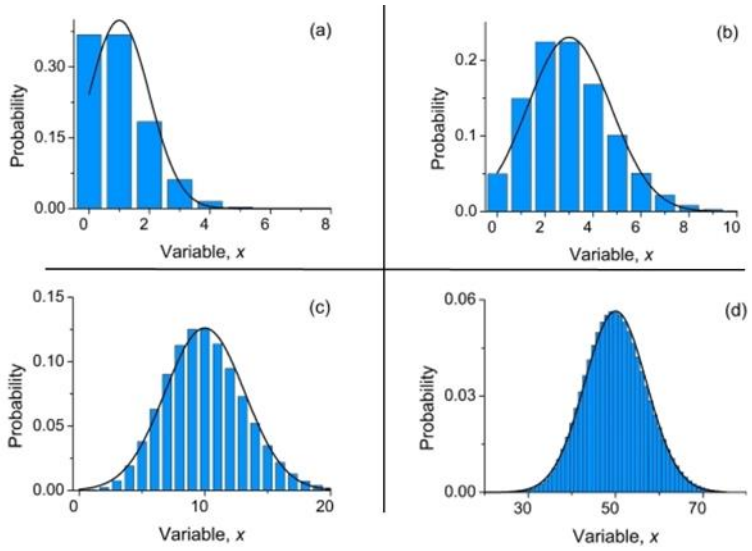
Probability Distribution

A probability distribution is a graph where the x-axis represents the values a random variable can take, and the y-axis represents how probable it is for a random variable to take the value in the x-axis. E.g:



Poisson Distribution

Poisson distribution is a discrete probability distribution where the mean is denoted by lamba (λ). It gives the probability of an event happening a certain number of times (k) within a given interval of time or space. E.g:



Binomial Distribution

Binomial distribution is calculated by multiplying the probability of success raised to the power of the number of successes and the probability of failure raised to the power of the difference between the number of successes and the number of trials. A binomial distribution is like a normal distribution in its structure, the distribution of data looks like a bell curve, except that binomial distributions are for discrete variables.

Binomial Distribution Formula

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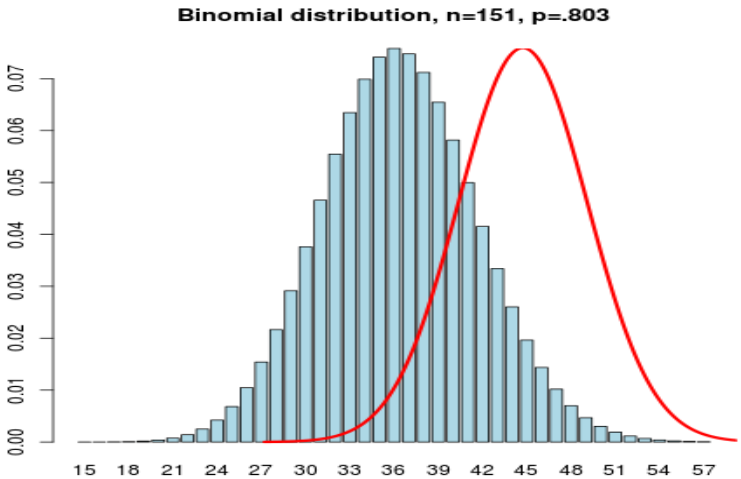
$$P(x) = \binom{n}{x} p^x q^{n-x} = \frac{n!}{(n-x)!x!} p^x q^{n-x}$$

where
n = the number of trials (or the number being sampled)
x = the number of successes desired
p = probability of getting a success in one trial
q = 1 - p = the probability of getting a failure in one trial



Probability Density Function

Probability density function is used to define the random variable's probability coming within a distinct range of values, as opposed to taking on any one value. The function explains the probability density function of normal distribution and how mean and deviation exists. The probability of random variable taking a range of values is calculated through getting the area below the curve of that range.