# Central Limit Theorem

**CLT -** Central Limit theorem states that if we collect any random samples from any population , then the mean value of those samples if plotted will reflect a normal distribution and the mean value of the sample will be equal to the mean of population in subject.

### Example of Central Limit Theorem

An investor is interested in estimating the return of ABC stock market index that is comprised of 100,000 stocks. Due to the large size of the [index](https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/dow-jones-industrial-average-djia/), the investor is unable to analyze each stock independently and instead chooses to use random sampling to get an estimate of the overall return of the index.

The investor picks random samples of the stocks, with each sample comprising at least 30 stocks. The samples must be random, and any previously selected samples must be replaced in subsequent samples to avoid bias.

If the first sample produces an average return of 7.5%, the next sample may produce an average return of 7.8%. With the nature of randomized sampling, each sample will produce a different result. As you increase the size of the sample size with each sample you pick, the sample means will start forming their own distributions.

The distribution of the sample means will move toward normal as the value of n increases. The average return of the stocks in the sample index estimates the return of the whole index of 100,000 stocks, and the average return is normally distributed.