*Businesses and researchers use the central limits theory in two ways:*

*1) to predict the probability of something happening, or*

*2) determine if something happened because of random chance or some external factors.*

*Please provide two examples.*

*For Example :*

*Insurance companies will use it to predict the probability of accidents given various parameters about the insured to come with a premium.*

The central limit theorem states that, given multiple samples taken from a population, the mean of those samples will converge on the actual population mean. More importantly, these mean or average samples will form a normal distribution pattern. This is true regardless of the actual population itself, which can have most any distribution, including being unknown or undefined. For the central limit theorem to hold true, a sufficiently large sample size must be created. Generally, sample sizes of at least 30 are required.

Two examples where CLT can be useful

Financial Market

Suppose that we are assembling a portfolio of stocks or other financial holdings and want to balance the overall risk against the possible rewards. We can help make that assessment by using the central limit theorem and our knowledge of the patterns found in normal distributions.

One way to approach this issue would be to consider how individual sectors of the economy have performed during various business cycles and incorporate that information into our investment model. We know that the returns for each sector might be quite variable over time. However, using the historical data, we can repeatedly take samples from each sector during various overall market cycles, and find the associated mean value for each sector.

In doing so, the central limit theorem states that we will create a good approximation of each sector's average return, along with a normal distribution of those sample averages. Each sector's normal distribution pattern will be narrower or wider, reflecting the extremes and risk inherent in that sector. All of this can be quantified using the normal distribution patterns, and their standard deviations and associated confidence levels.

Quality Control

The central limit theorem also plays an important role in modern industrial quality control. The first step in improving the quality of a product is often to identify the major factors that contribute to unwanted variations. Efforts are then made to control these factors. If these efforts succeed, then any residual variation will typically be caused by many factors, acting roughly independently. In other words, the remaining small amounts of variation can be described by the central limit theorem, and the remaining variation will typically approximate a normal distribution. For this reason, the normal distribution is the basis for many key procedures in statistical quality control.