Using the Typical Problem with NormSDist Spreadsheet.

The most common type of problem that relies upon the Central Limit Theorem requires four inputs:

Two relate to the overall population.
Mean value for some measurement taken from a population [Cell C2]
Standard deviation for that population [Cell E4]

While two relate to the sample.
Number of items n in a sample taken from the population (sample size) [Cell E7]
Mean value for the sample [Cell B5]

Using only these four inputs it is possible to determine *how unlikely* it is to observe the sample mean by chance alone. In other words, if the sample is truly chosen at random from the population, what is the probability of observing a sample mean as far or farther from the population mean?

Example

Question. Assume a money manager selects an equal-weighting of 50 stocks from a stock market and hold those stocks for a year. If the mean annual return of all stocks in that market is 8%, and the stocks making up that that market had an annual standard deviation of excess returns against the mean return (a cross-sectional dispersion) of 20%, what is the probability that the manager's portfolio returns 13% by chance alone?

Answer:

Mean value for some measurement taken from a population is [8%] .
Standard deviation for that population is [20%].
Number of items n in a sample taken from the population (sample size) is [50].
Mean value for the sample is [13%].

Standard deviation of sample means is 20%/sqrt(50) = .02828 or 2.928%.
The z-score of a 13% return is (13% - 8%)/2.828% = 1.77.
Using the Excel formula 1- NormSDist(z) [Cell B19] gives a probability of 3.85%.

There is a 3.85% probability that the manager could achieve these results or better by chance alone.