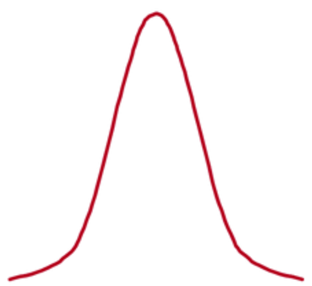
THE NORMAL DISTRIBUTION

Normal Distribution Curve

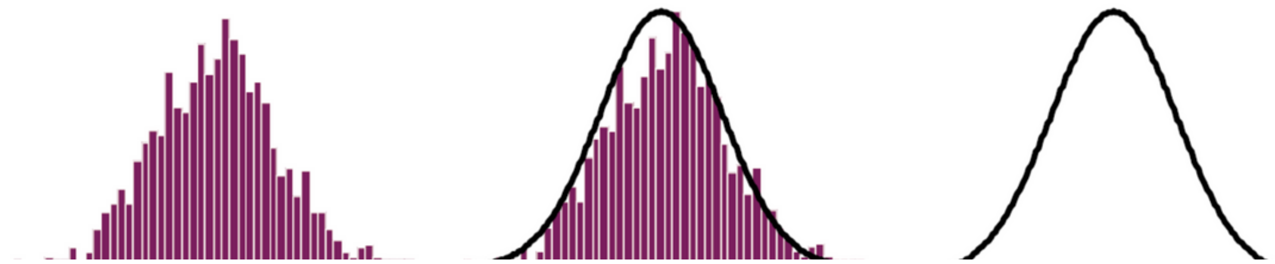


Normal, bell-shaped or Gaussian distribution.

Defined by two parameters:
1) μ = mean
2) σ = the standard deviation

Normal curve has the following mathematical properties:
- Symmetrical about the mean μ
- Total area under the curve is defined to be 1
- It approaches the horizontal axis about three values of σ either side of μ

Histogram → Normal Distribution

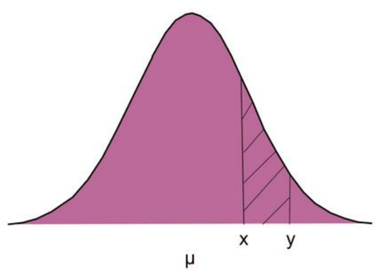


Calculation of normal distribution probabilities

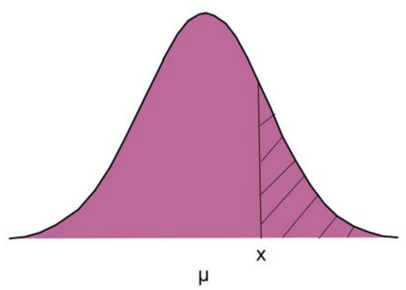
There are three basic types of probabilities that can be calculated, namely:

1. The probability of finding a value between two specific points.
2. The probability of finding a value being below a specific point.
3. The probability of finding a value above a specific point.

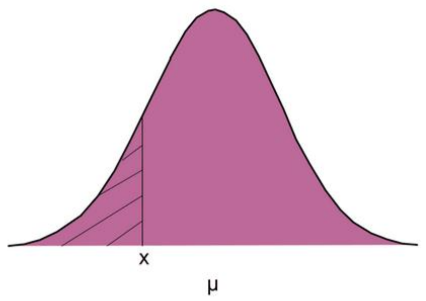
The probability that a value from a normal distribution lies between two points x and y is equal to the area under the normal curve between x and y.



The probability that a value lies above a point x is equal to the area under the curve to the right of x



The probability that a value lies below a point x is equal to the area under the curve to the left of x



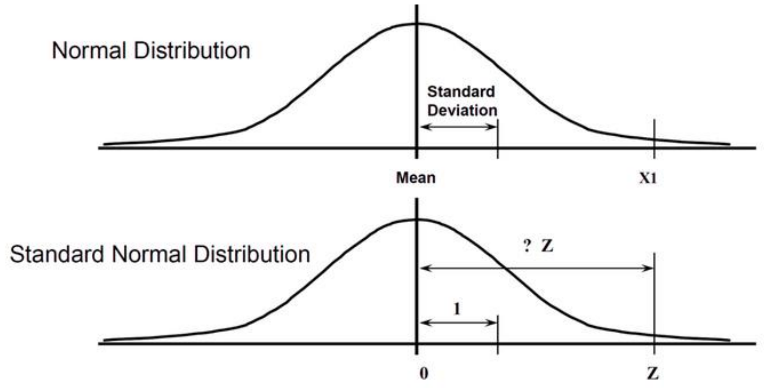
The Standard Normal Distribution

General mathematics technique for finding area under curves is the process of integration which is part of calculus. These have been converted into tables for the standard normal distribution (see table 2 on p.553)

Which has:
- Mean = μ = 0
- Standard Deviation = σ = 1

Calculate the Z Score

We can find the areas under any normal curve with any value of μ and any value of σ. To do this we must first convert a raw score of X to a standard score (or z score) using the formula in Equation 2.6 (p 51)



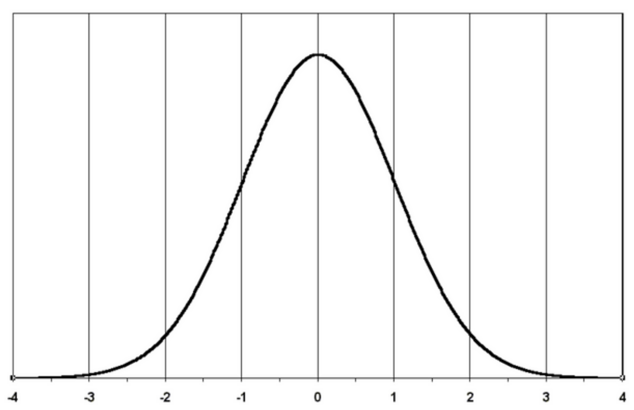
$$z = \frac{X_i - \text{Mean}}{\text{Standard Deviation}} = \frac{x-\mu}{\sigma} \qquad (2.6)$$

$$z = \frac{x-\mu}{\sigma} \qquad (2.6)$$

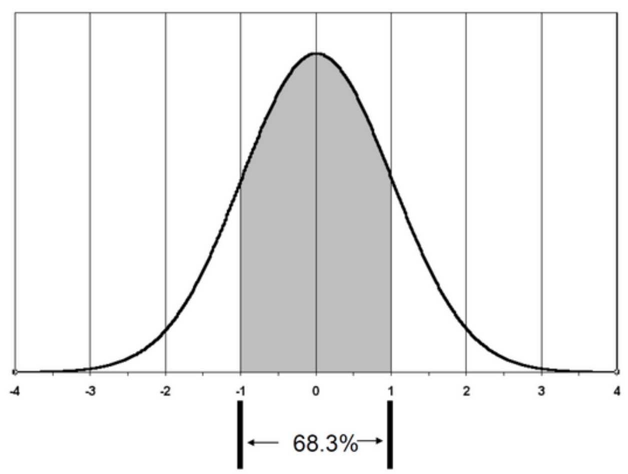
or

$$X = \mu + z\sigma \qquad (2.7)$$

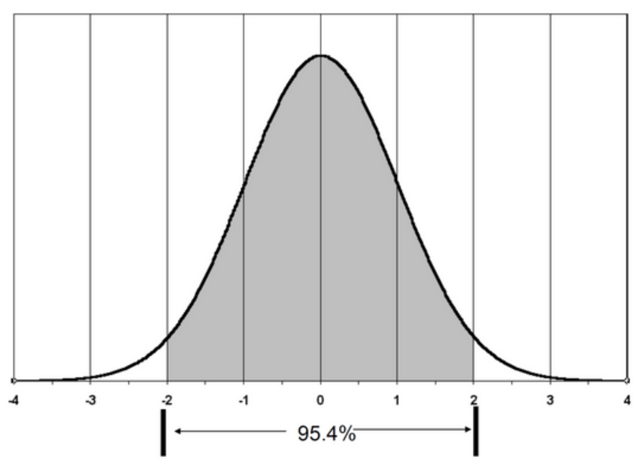
The Standard Normal Distribution, N(0,1)



68.3% Of data fall within ONE standard deviation of the mean



95.4% Of data fall within TWO standard deviation of the mean



99.73% Of data fall within THREE standard deviation of the mean