Acumen Tutoring

Symbols

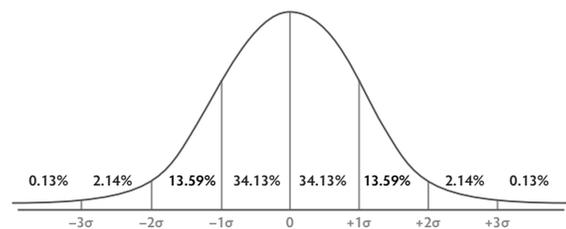|			
μ	Mean of population	σ	Standard deviation of population data
$\bar{x}$	Mean of sample	s	Standard deviation of sample
σ^2	Variance of population data	$N(\mu, \sigma^2)$	
s^2	Variance of sample data, unbiased		Normal distribution with specified μ and σ^2
s_n^2	Variance of sample data, biased		

Definitions

First Quartile (Q1)	The median of all values lower than the population median
Third Quartile (Q3)	.The median of all values higher than the population median
Interquartile Range (IQR)	The difference between the 3rd and 1st quartiles; *i.e.,* Q3 – Q1
Outlier	A data value that lies more than 1.5 × IQR above Q3 or below Q1. The outlier is *extreme* if it lies more that 3 × IQR from the closest Q and *mild* otherwise

Normal Distribution

To Calculate Standard Deviation

1 Calculate the mean (μ)

2 Calculate the distance of each data value from the mean (value – μ)

   This is the *deviation* of each data point

3 Square each deviation

4 Calculate the average of the squares; this is the *variance* of the data (σ^2).

  ▷ If your data is the entire population, add up the squares and dividing by *n.*

  ▷ If your data is from a sample, add up the squares and dividing by *n* – 1.

   This is the *variance* of the data (σ^2)

5 Take the square root of the variance; this is the standard deviation, σ.

The normal distribution curve with percentages: 0.13%, 2.14%, 13.59%, 34.13%, 34.13%, 13.59%, 2.14%, 0.13% across -3σ, -2σ, -1σ, 0, $+1\sigma$, $+2\sigma$, $+3\sigma$

Normal Distribution Probabilities

Z-score

The number of standard deviations a particular data value, *x*, is from the mean.

$$z = \frac{x - \mu}{\sigma}$$

p-value

The probability that a randomly-chosen element will be less than a particular value in a normally-distributed population.

> ▷ This is the area under the normal distribution curve to the left of the value.

> ▷ You look this value up in the z-table or use *normalcdf* on the calculator (see sidebar).

Calculator Note

On your graphing calculator, three functions apply to normal distribution probabilities:

• *normalcdf* Calculate the probability that an *x* value will be between two values.

• *normalpdf* Calculate the probability of a particular *x* value (that is, the *y* value of the curve).

• *InvNorm* Calculate the z-score for a given *p*-value.