

Statistics: Normal Distributions, 68-95-99.7 Rule

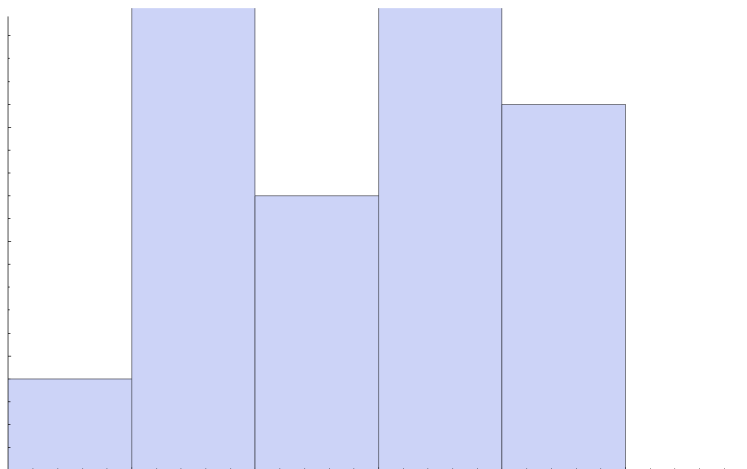
Contemporary Math

Josh Engwer

TTU

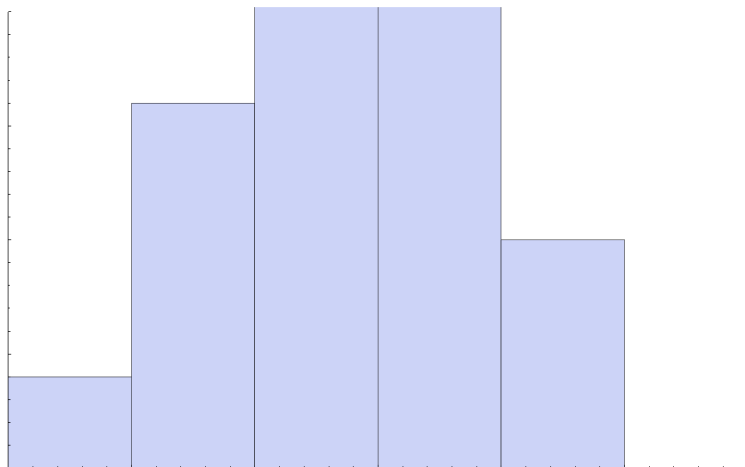
04 August 2015

Increasing the Sample Size of a Data Set



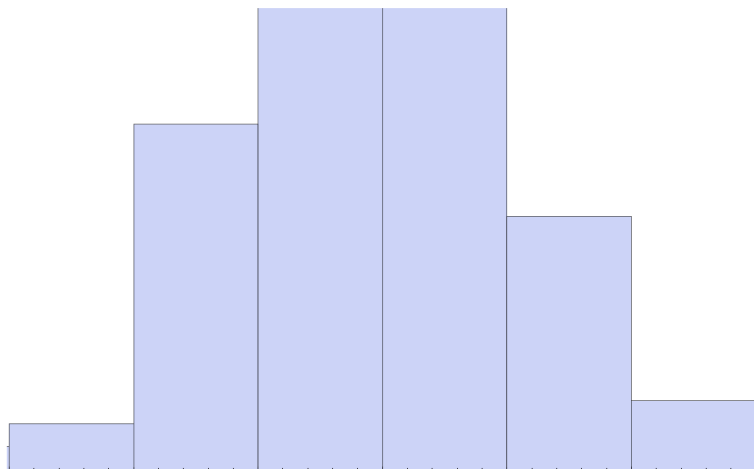
$n = 25$

Increasing the Sample Size of a Data Set



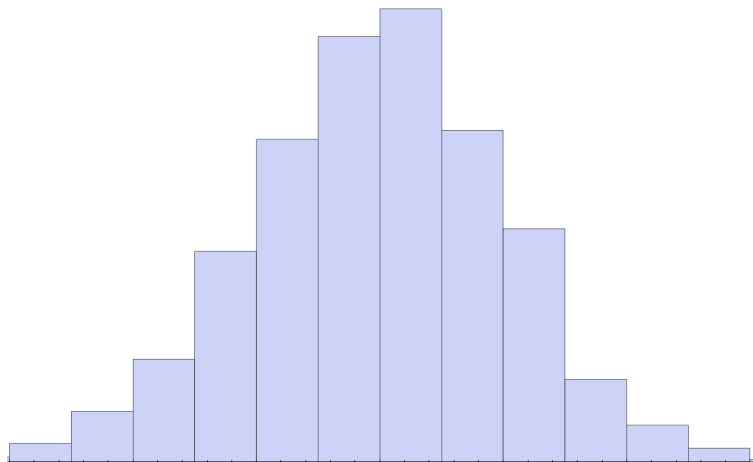
$n = 50$

Increasing the Sample Size of a Data Set



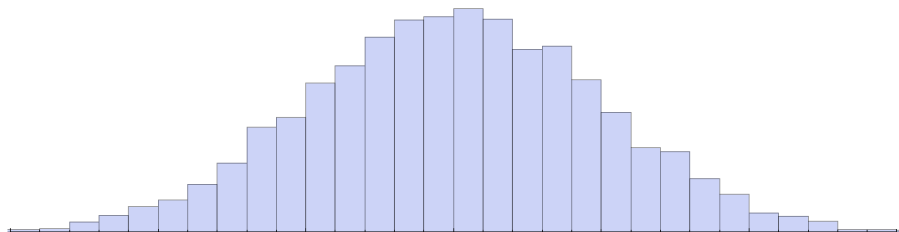
$n = 100$

Increasing the Sample Size of a Data Set



$n = 1000$

Increasing the Sample Size of a Data Set

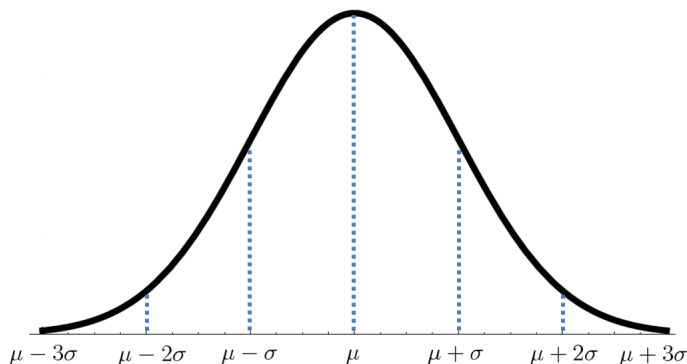


$n = 5000$

Normal Distributions

A **normal distribution** describes many real-life populations such as:

- Heights of people
- Lifespans of a certain model consumer electronic device
- Standardized exam scores



NOTATION: $\mu \equiv$ Mean of Population (Greek letter "mu")

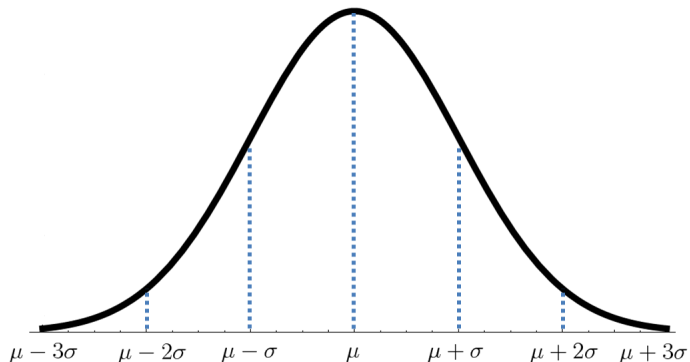
NOTATION: $\sigma \equiv$ Std. Dev. of Population (Greek letter "sigma")

Normal Distributions (Properties)

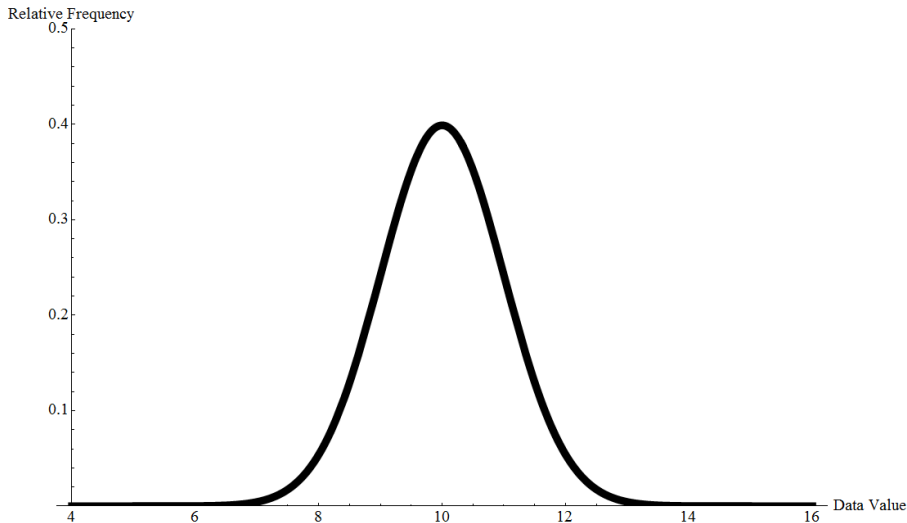
Proposition

(Properties of a Normal Distribution)

- Mean = Median = Mode = μ
- Curve is bell-shaped & symmetric w.r.t its mean, μ
- The total area under the curve is 1



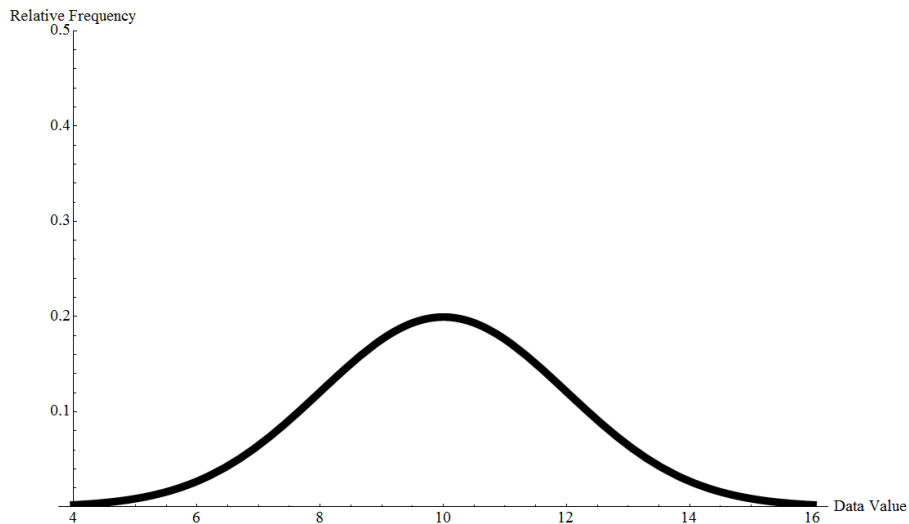
Varying σ Changes the Shape of a Normal Distribution



$$\mu = 10$$

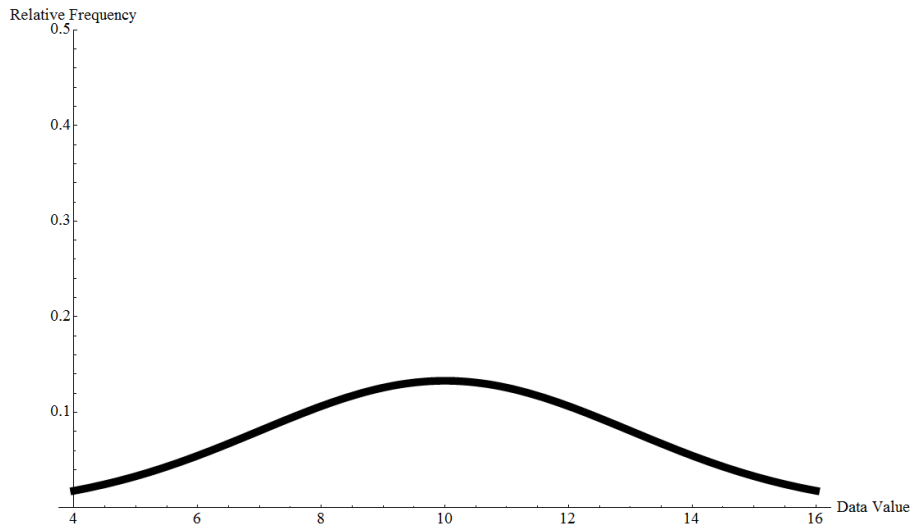
$$\sigma = 1$$

Varying σ Changes the Shape of a Normal Distribution



$$\mu = 10$$
$$\sigma = 2$$

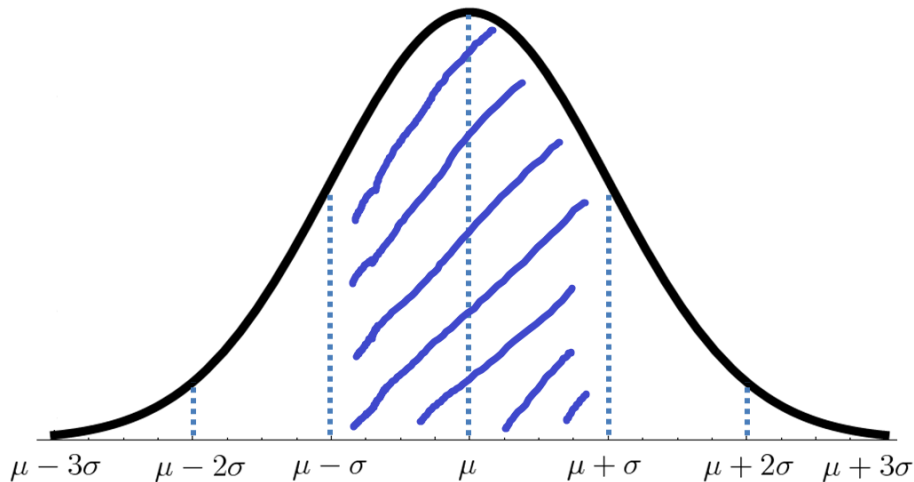
Varying σ Changes the Shape of a Normal Distribution



$$\mu = 10$$
$$\sigma = 3$$

68-95-99.7 Rule

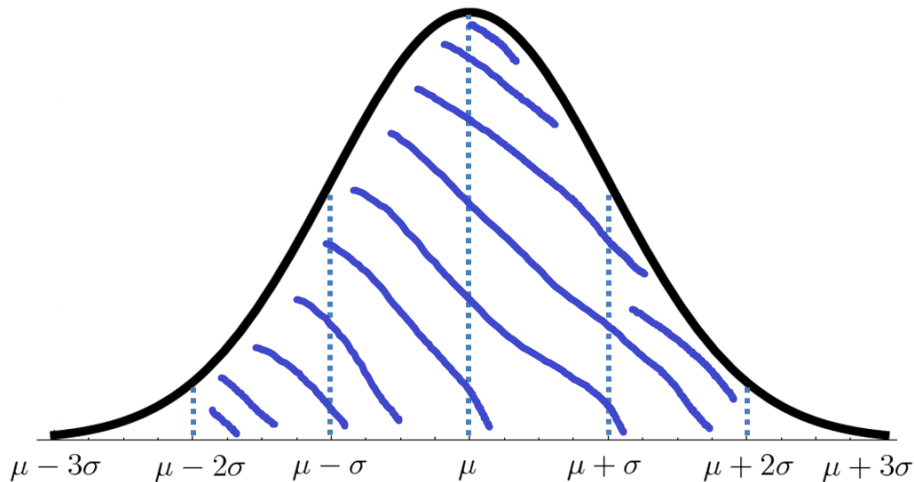
Given a normal distribution:



Roughly 68% of the data values are within 1 standard deviation from the mean.

68-95-99.7 Rule

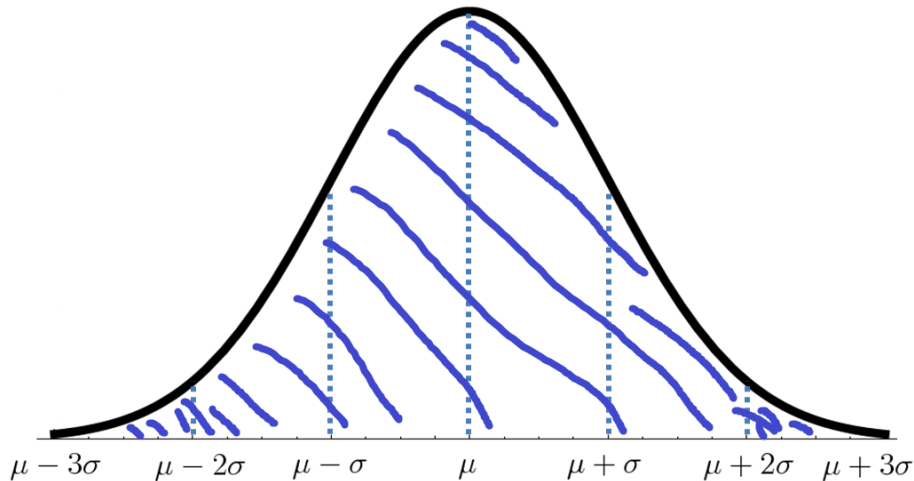
Given a normal distribution:



Roughly 95% of the data values are within 2 standard deviations from the mean.

68-95-99.7 Rule

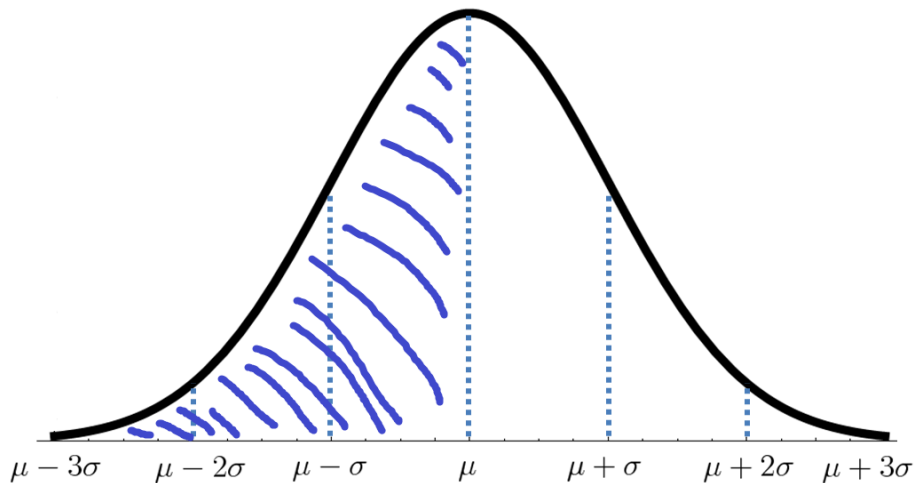
Given a normal distribution:



Roughly 99.7% of the data values are within 3 standard deviations from the mean.

68-95-99.7 Rule

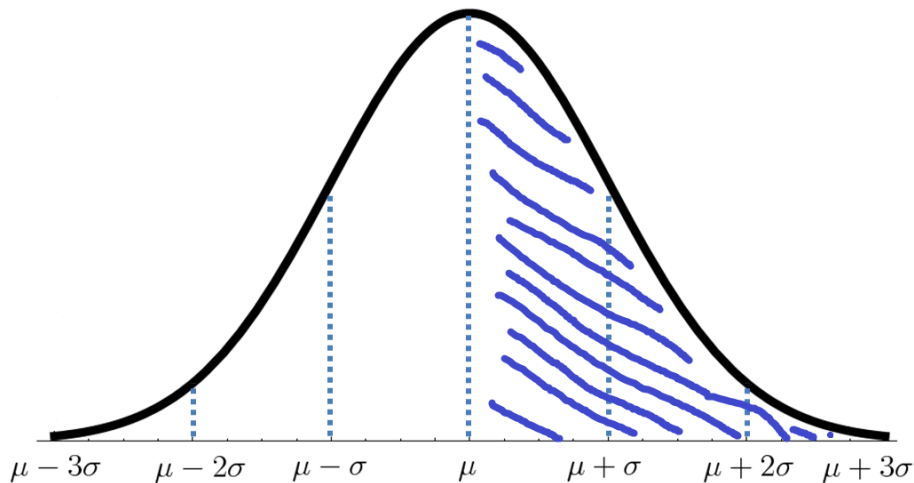
Given a normal distribution:



Roughly 50% of the data values are less than the mean.

68-95-99.7 Rule

Given a normal distribution:



Roughly 50% of the data values are greater than the mean.

Fin.