

Normal Distribution

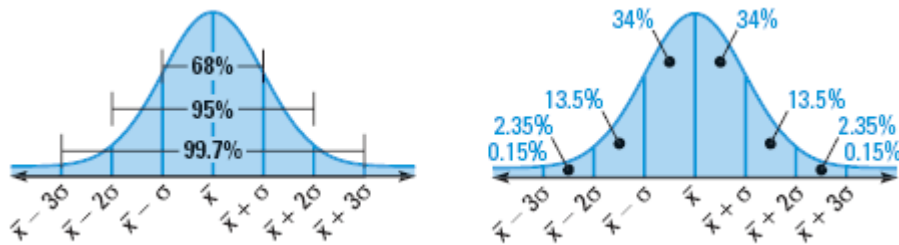
A special type of probability distribution is a normal distribution.

Normal Distribution is modeled by a bell-shaped curve called a normal curve that is symmetric about the mean

Areas Under a Normal Curve (Empirical Rule)

A normal distribution with mean \bar{x} and standard deviation σ has the following properties:

- The total area under the related normal curve is 1.
- About 68% of the area lies within 1 standard deviation of the mean.
- About 95% of the area lies within 2 standard deviations of the mean.
- About 99.7% of the area lies within 3 standard deviations of the mean.



Example 1

A) A normal distribution has mean \bar{x} and standard deviation, σ . For a randomly selected x-value from the distribution, find $P(\bar{x} - \sigma \leq x \leq \bar{x} + 3\sigma)$.

B) A normal distribution has mean \bar{x} and standard deviation, σ . For a randomly selected x-value from the distribution, find $P(\bar{x} - 2\sigma \leq x \leq \bar{x} + \sigma)$.

Example 2

- 1) The score on an exam for entrance to a firefighter program are normally distributed with a mean of 200 points and standard deviation of 20 points. Draw Normal Curve first and label.
 - a. About what percent of the candidates score lower than 160 points?
 - b. Candidates with scores above 220 are admitted into the training program. About what percent of the candidates are accepted into the program?

- 2) Professor Halen's midterm exam is *normally distributed* with a mean of 72.3 and a standard deviation of 8.9. Draw Normal Curve and label.
 - a. About what percent of students can expect to score lower than 81.2 percent?
 - b. About what percent of students can expect to receive a score between 81.2 and 90.1?