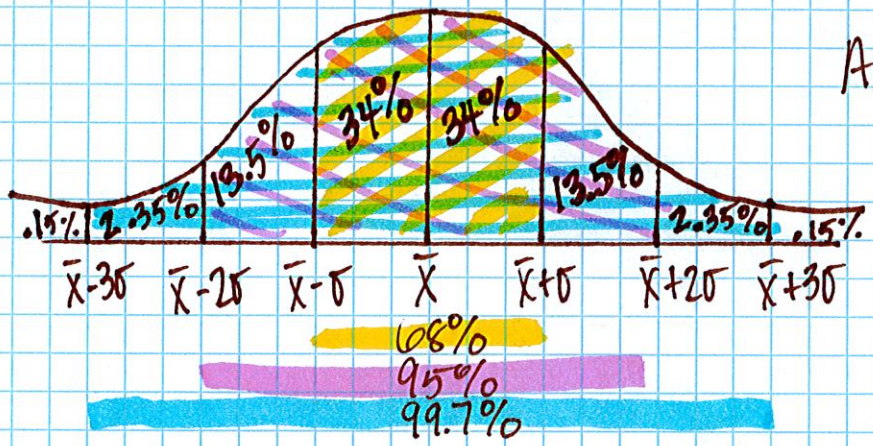
Notes: Normal Distribution and z-Scores

Normal Distribution: A probability distribution with mean $\bar{x}$ and standard deviation σ modeled by a bell-shaped curve with the area properties below



Area Under Curve = 100%

Normal Curve: A smooth symmetrical, bell shaped curve that can model normal distributions.

Standard Normal Distribution: The normal distribution with a mean 0 and a standard deviation of 1.

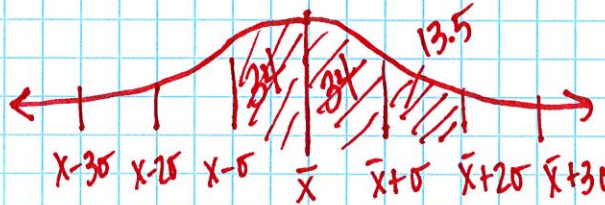
z-Score: The number z of standard deviations that a data value lies above or below the mean of the data set

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

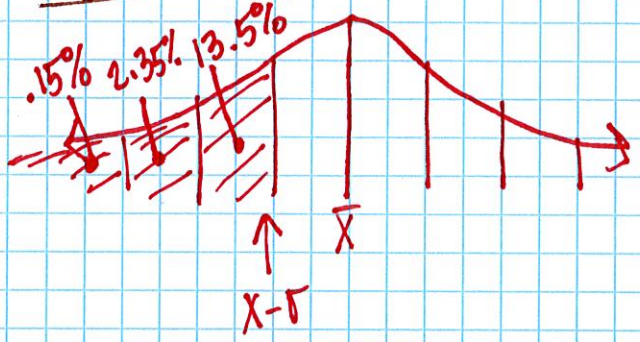
x = data
$\bar{x}$ = mean of a set of data
σ = standard deviation of a set of data

Example 1 A normal distribution has a mean $\bar{x}$ and a standard deviation σ. For a Randomly selected x-value from the distribution, find

$P(\bar{x} - \sigma \leq x \leq \bar{x} + 2\sigma)$ $P = 34\% + 34\% + 13.5\% = 81.5\%$

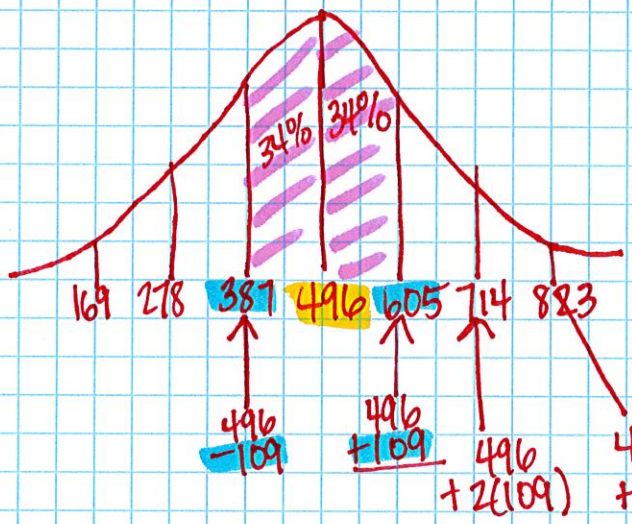


Try It 1 $P(X \leq \bar{X} - \sigma) = 13.5\% + 2.35\% + .15\% = 16\%$



Example 2: The math scores of an exam for the state of Georgia are normally distributed with a mean of 496 and a standard deviation of 109. About what percent of the test-takers Received scores between 387 and 605?

$= 34\% + 34\% = \boxed{68\%}$



Example 3 From Ex2 Test Takers, find the probability that a Randomly selected test-taker Received a math score of

A. at most 630 — Because is not at an exact Standard deviation I need to find my z-score

88.49%

$z = \frac{X - \bar{X}}{\sigma} = \frac{630 - 496}{109} = 1.22$

B. greater than 630

100%
− 88.49%
11.51%

Try It 2: What % of the test-takers Received scores between 496 and 714?

34% + 13.5% = 47.5%

Try It 3 Find the probability that a Randomly selected test-taker Received a math score of at most 620.

$\frac{620 - 496}{109} = 1.1 = 86.43\%$