GRE-2, Data Analysis

The Standard Deviation

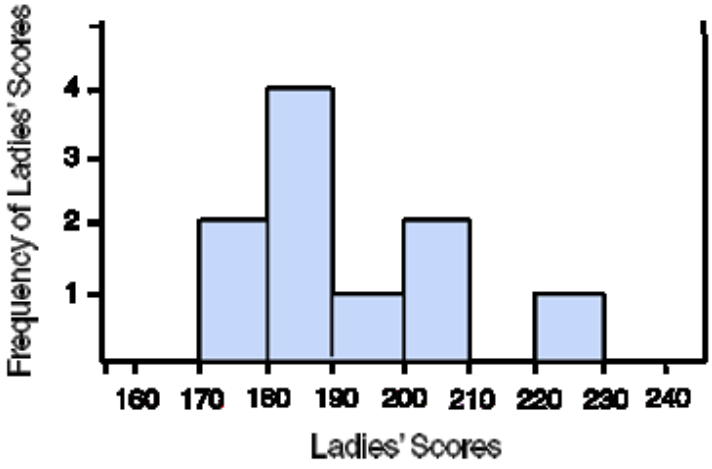
Definition

Standard = "For a typical value in the list"
Deviation = "Distance from the mean"
Thus, the standard deviation describes a "typical plus / minus distance from the mean."

Representation

Putting mean in middle and counting three SD's to the left and right will capture all or nearly all values.

Ex: "Ladies' scores have a mean of 200 and a standard deviation of 10."



z-score = # of SD's from the mean

$$z = \frac{x - M}{SD}$$

1. What is the *z*-score for a test score of 185?

2. What test score is 2.5 standard deviations above the mean?

Percentiles, quartiles, and IQR

Percentiles

A percentage of a distribution is best represented by area on its graph.
Percentile of x = Percentage of scores below x
Percentiles are cumulative; they add / subtract.

If Alex is at the 30th percentile and Bobby is at the 80th percentile,

1. What percent of students scored worse than Alex?

2. What percent of students scored better than Bobby?

3. What percent of students scored between Alex and Bobby?

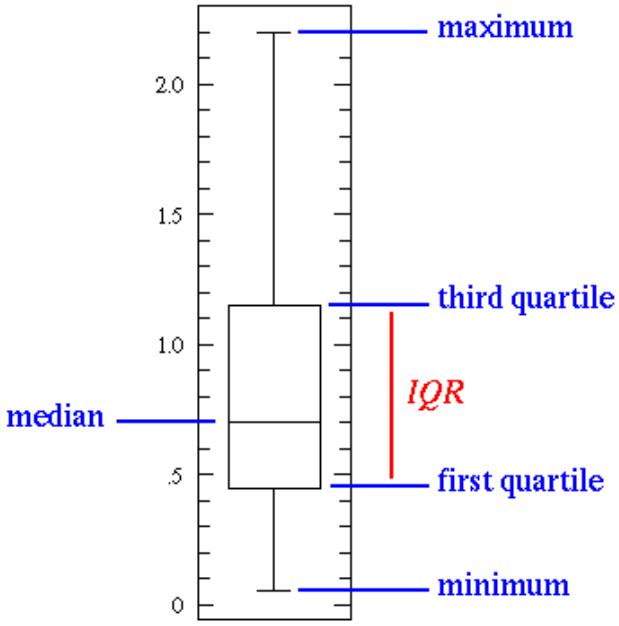
Raw scores don't give this information.

Quartiles

25th percentile = 1st quartile = Q1
50th percentile = median = 2nd quartile = Q2
75th percentile = 3rd quartile = Q3

A box-and-whisker plot uses this "five number summary" to represent the distribution.

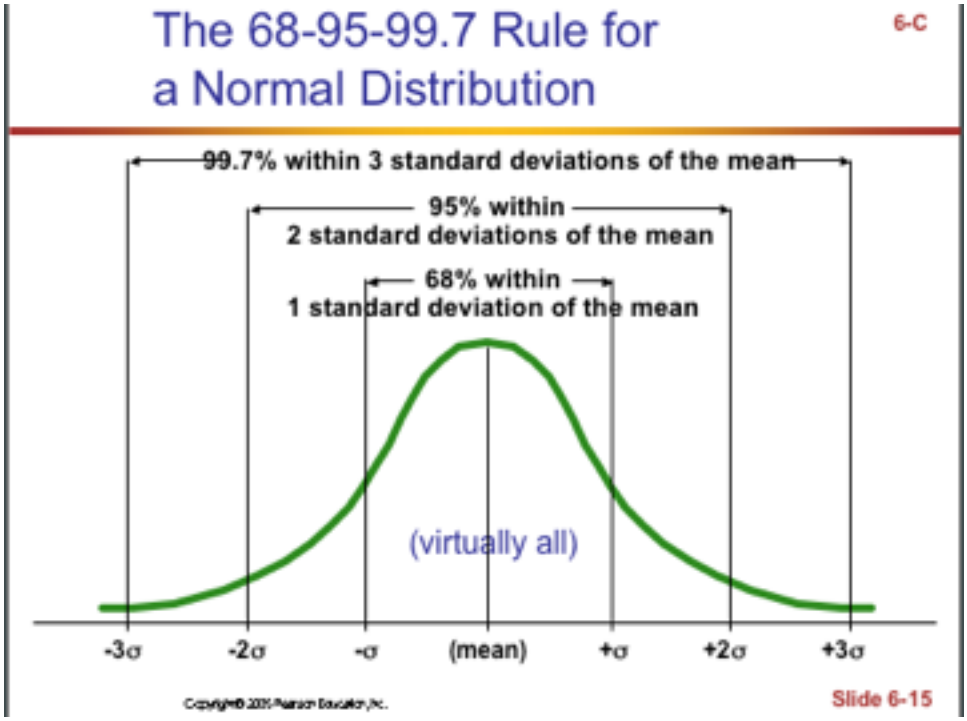
Inter-Quartile Range = IQR
= Q3 – Q1
(a single number)



1. Referring to the box-and-whisker plot above, what shape is its distribution?
2. What is its median?
3. What is its IQR?
4. If this graph represents weights of packages, what percent of packages weigh between 0.45 and 0.7 pounds?
5. If there are 5,600 packages at the post office, how many of them weigh less than 1.15 pounds?

The Normal Distribution

This is a particular type of "bell curve" with a known relationship between *z*-scores and percentiles.



If checkout times at a grocery store are normally distributed with mean = 3.6 minutes and SD = 0.9 minutes, what percent of checkouts are

1. Between 2.7 and 4.5 minutes?

2. Between 4.5 and 5.4 minutes?

3. Greater than 6.3 minutes?