

Lecture 2.4A Measures of Variation

In order to give a more complete description of the population or sample, it is necessary to measure the dispersion, or spread of the data.

Range = high score minus low score

Range is very easy to compute but greatly affected by an outlier value. So the range can be misleading. Also it only used two values.

Deviation of an entry x is the difference between the entry and the mean of the data set.

$x - \mu$ (population deviation) $x - \bar{x}$ (sample deviation)

The deviation may be positive, negative, or zero. The sum of all the deviations always equals zero.

Standard Deviation is a measure of variation of scores about the mean.

Sample Standard Deviation
$$S = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

Population Standard Deviation
$$\sigma = \sqrt{\frac{\sum (x - \mu)^2}{n}}$$

Where x is any data value and n is the number of data values.

To find the Variance(steps 1-5) and Standard Deviation(steps 1-6)

1. Find the mean of the data set.
2. Find the deviation of each entry. Use $x - \bar{x}$ or $x - \mu$
3. Square each deviation. $(x - \bar{x})^2$ or $(x - \mu)^2$
4. Add to get the sum of the squares.
 $SS_x = \sum (x - \bar{x})^2$ or $\sum (x - \mu)^2$

SS_x = means the sum of the squares

5. Divide by N for population and $n - 1$ for sample
6. Take the square root of the variance.

Example : Ten days during the last year were selected at random. The selling price for Albion Inc. stock on each of the days were recorded as:

26 26 27 28 31 33 33 37 37 37

Find the range:

Find the variance:

Find the standard deviation:

x	$x - \bar{x}$	$(x - \bar{x})^2$
26		
26		
27		
28		
31		
33		
33		
37		
37		
37		

Find the variance:

Find the standard deviation: