Variance v. Standard Deviation

- Variance and Standard Deviation are both defined as…

  a measure of spread of the observations from the mean.

The difference between the two is that variance is simply the squared spread of the standard deviation.

- Formulas/symbols to know:
  - The formula to find variance is…

$$s^2 = \frac{\left(\sum x_i^2\right) - \frac{\left(\sum x_i\right)^2}{n}}{n-1}$$

  - The formula to find standard deviation is…

$$s = \sqrt{s^2}$$

  - The symbols depending on sample v. population:

Variance: s^2 or σ^2

Standard deviation: s or σ

- Calculator Trick
  - How to do it!

Enter data: STAT → 1:Edit

1-var stat: STAT → CALC → 1:1-Var Stats

  - What are we looking for?

Standard deviation we use will show as Sx.

To find variance, simply square what you find as Sx.

- Practice the concepts by solving the problems for both Variance and Standard Deviation by hand for a and b, but via calculator for c.
  a. [10, 9, 2, 1, 4, 3, 5, 8, 10, 2, 7, 5]

$n = 12$

$\sum x_i = 10+9+2+\ldots+5 = 66$

$\sum x_i^2 = 10^2+9^2+2^2+\ldots+5^2 = 478$

$$s^2 = \frac{(478) - \frac{(66)^2}{12}}{12-1} = 10.45$$

$$s = \sqrt{10.45} = 3.23$$

b. [8, 7, 10, 8, 6, 1, 10, 8, 5, 3, 6, 6, 4, 8] $n=14$

$\Sigma x_i = 8+7+10+\ldots+8 = 90$

$\Sigma x_i^2 = 8^2+7^2+10^2+\ldots+8^2 = 664$

$s^2 = \frac{(664)-\frac{(90)^2}{14}}{14-1} = \boxed{6.57}$ $\quad s = \sqrt{6.57} = \boxed{2.56}$

c. [42, 17, 20, 89, 23, 56, 78, 34, 91, 65, 65, 12] $\rightarrow L_1$

Showing Work using 1-var stats:

$\Sigma x = 592$ $\quad \Sigma x^2 = 38154$ $\quad n = 12$

$s^2 = \frac{(38154)-\frac{(592)^2}{12}}{12-1} = \boxed{813.52}$ $\quad s = \sqrt{813.52} = \boxed{28.52}$

Finding it on 1-var stats:

$Sx = 28.52$