IB Math 1 23C Variance and Standard Deviation

Measures of Center: mean, median, mode

Measures of Spread: range, interquartile range, standard deviation, variance

$x_1, x_2, x_3, \ldots x_n$ Data (sample) inches

$\bar{x}$ **Mean** (of the sample) in Note: μ is the mean of the *population*.

$x_i - \bar{x}$ Deviation from the mean; how far x_i is from the mean.
Positive → above the mean
Negative → below the mean in

$(x_i - \bar{x})^2$ Deviation squared in^2
Square so everything is positive

$\sum_{i=1}^{n}(x_i - \bar{x})^2$ Add up the squared deviations in^2

Big → really spread out (lots of variation)
Small → most values are close to $\bar{x}$ (little variation)

$$\sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}$$ **Variance** in^2

Divide by n. Average of the squared deviations.

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}}$$ **Standard Deviation** in

On average, how far the data is from the mean.
Always positive.

The number of points scored by Andrew and Brad in the last 8 basketball matches are tabulated below.

Points by Andrew	23	17	31	25	25	19	28	32
Points by Brad	9	29	41	26	14	44	38	43

1. Use formulas to calculate the mean and standard deviation of Andrew's scores.

Andrew

x_i	$x_i - \bar{x}$	$(x_i - \bar{x})$
23	-2	4
17	-8	64
31	6	36
25	0	0
25	0	0
19	-6	36
28	3	9
32	7	49
	Total:	198

$\bar{x} = 25$ points

Variance: $\sigma^2 = \frac{198}{8} = 24.75$ points^2

Standard Deviation: $\sigma = \sqrt{24.75}$

$\sigma \approx 4.97$ points

2. Use your GDC to calculate the mean and standard deviation of Brad's scores.

$\bar{x} = 30.5$ points $\quad \sigma = 12.56$ points

3. What ~~conclusions~~ comparisons can you make about Andrew and Brad as basketball players based on your answers to 1 and 2?

Andrew is more consistent (smaller st. dev.).
Brad is inconsistent but better (higher mean).

23C.1 (1-8)
23C.2 (odds)
Review sets 23A(1-9)
23B (1-9)
23C (1,4,5,7)

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- New Document, 4: Add Lists & Spreadsheet
- ~~Name your columns (e.g., x for data values and f for frequency).~~ not needed unless you have frequencies
  ~~Name goes in the top box with a letter.~~
- Enter the data.
- Menu, 4: Statistics, 1: Stat Calculations, 1: One-Variable Statistics
- Num of Lists: 1
  X1 List: x
  Frequency List: f

TI-83/84

- STAT, EDIT
- Clear any lists that have values: Arrow up to highlight list name (L1), CLEAR, ENTER
- Enter the data.
- Quit to the home screen
- STAT, CALC, 1: 1-Var Stats
- If you have a list of data values and a list of frequencies: 1: 1-Var Stats (L1, L2)