MEASURES OF SPREAD IN DATA

Learning goals

- **find and interpret standard deviation**

Measures of central tendency

= values describing the **"middle"**

↑
mean
median
mode

Measure of spread

= values describing how **"spread out"** the values are

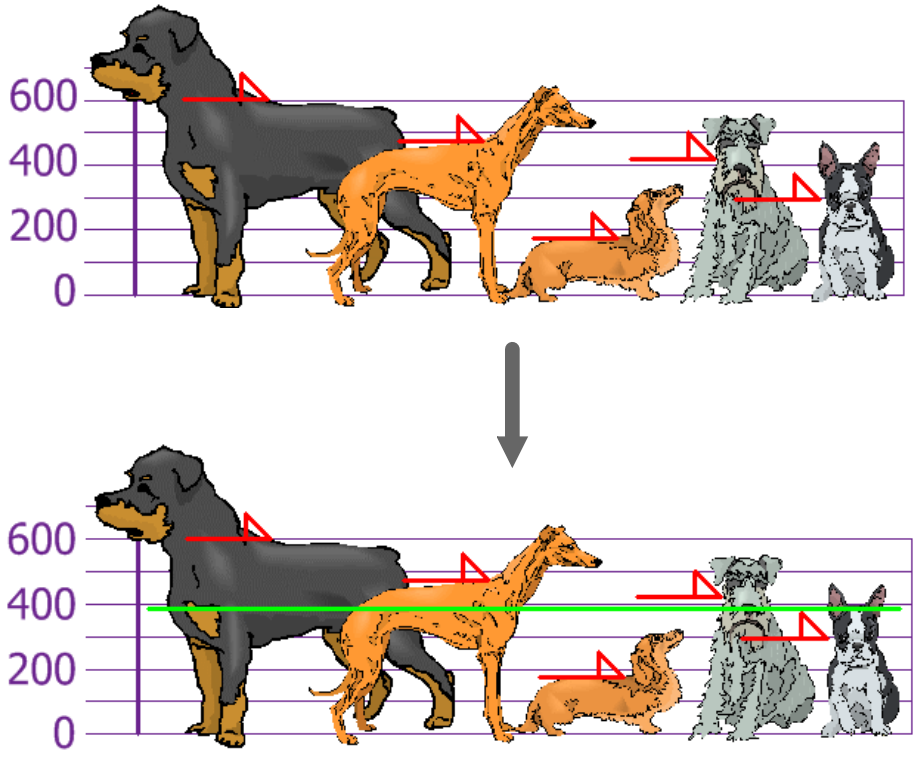
↑
are the values close together?

Range: the difference between the lowest and the highest values in a set of data.

Variance: the average of the squared differences from the mean

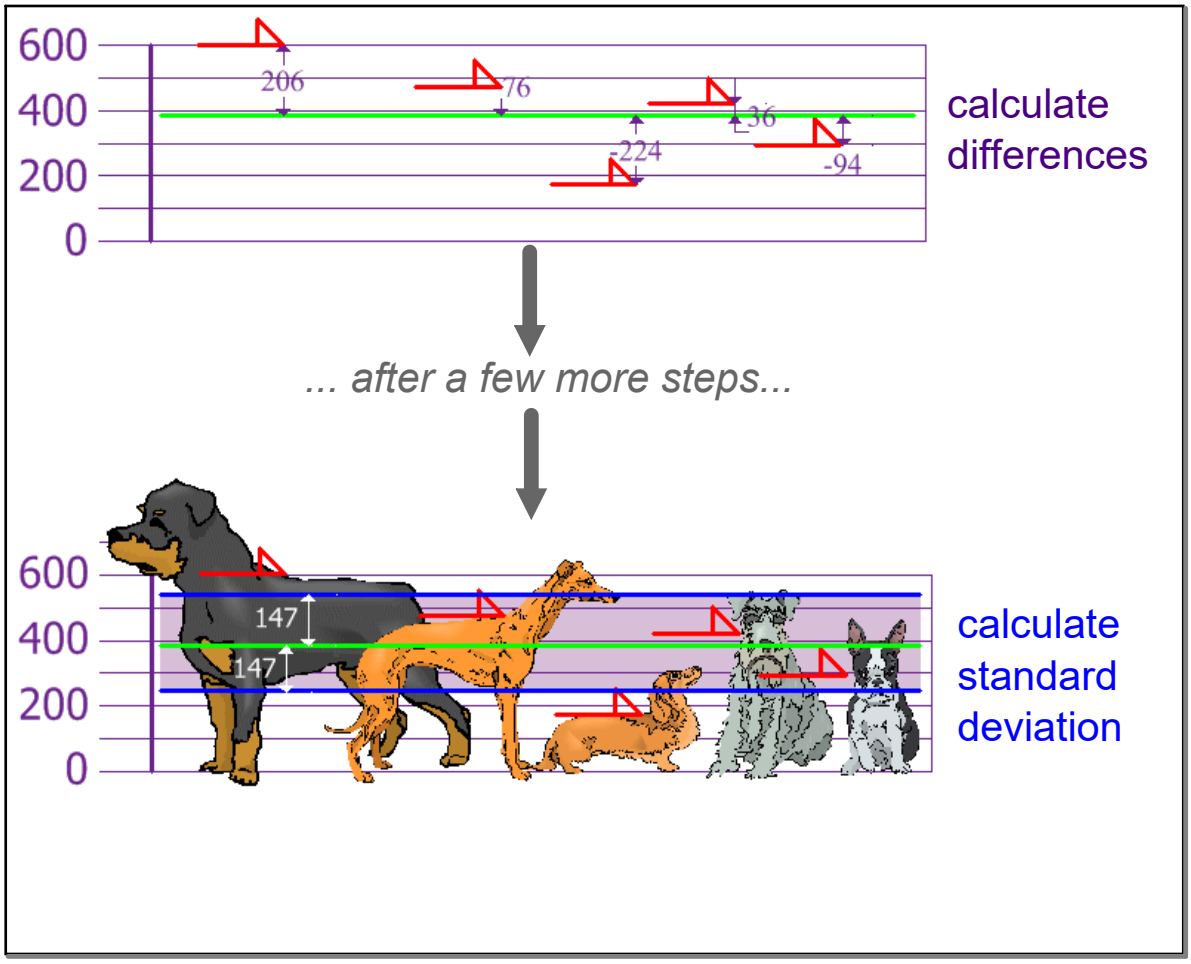
Standard deviation: the typical distance of a value from the mean

*** *Bigger standard deviation and variance means more spread out data.*



measure heights

find the mean



Example:

Myrena received the following test scores on her last 4 tests: 75, 64, 83, 72

a) Find the range of her scores.

Range = highest value - lowest value

= 83 − 64

= 19

b) Find the variance.

Steps

1. Calculate the mean
2. In a chart ... value-mean
3. In a chart ... difference^2
4. Find mean of the squares

* round all answers to whole #s please!

Step 1: Mean

$$\frac{75+64+83+72}{4} = 73.5$$

$\doteq 74$

Values	Step 2: $x-\bar{x}$ (value - mean)	Step 3: $(x-\bar{x})^2$ (difference)^2
75	$75-74=1$	$1^2=1$
64	$64-74=-10$	$(-10)^2=100$
83	$83-74=9$	$9^2=81$
72	$72-74=-2$	$(-2)^2=4$

Step 4: Find the mean of the squares

$$\text{Variance} = \frac{1+100+81+4}{4} = 46.5$$

$\doteq 47$

c) Find the standard deviation.

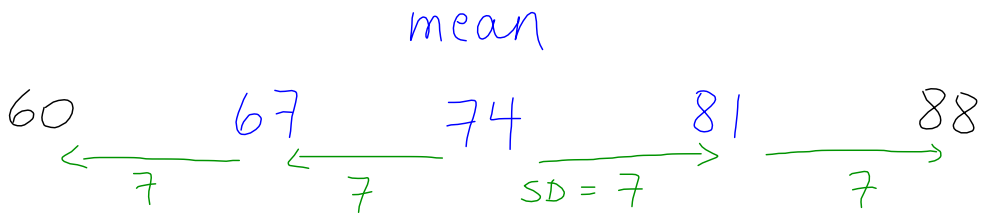
standard deviation = $\sqrt{\text{varience}}$

$= \sqrt{47}$

$= 6.86$

$\doteq 7$

What does this all mean?



68% of her marks are between 67 and 81

2 SD away $\Rightarrow$ 95%

3 SD away $\Rightarrow$ 99.7%

Where should Franco go on vacation?

Garden Beach vs. Sunny Vale

Garden Beach has average monthly temperatures of

20, 23, 25, 36, 33, 17, 14

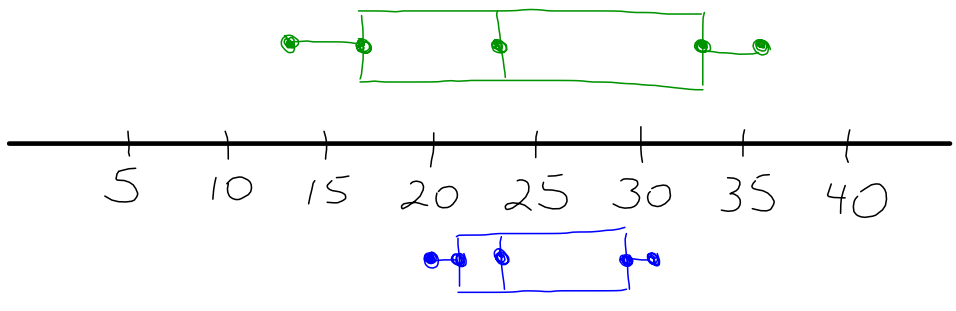
Sunny Vale has average monthly temperatures of

22, 28, 30, 29, 23, 21, 20

Find:	Garden B	Sunny V
Range	36 - 14 = 22	30 - 20 = 10
Median	23	23
Lowest value	14	20
25%	17	21
50%	23	23
75%	33	29
Highest value	36	30

Make a Box and Whisker plot

GB



SV

What does your analysis show?

Garden Beach is more spread out

Find Variance using the chart for Garden Beach.

Temperature	$x - mean$	$(x - mean)^2$
20	$20 - 24 = -4$	$(-4)^2 = 16$
23	$23 - 24 = -1$	$(-1)^2 = 1$
25	1	1
36	12	144
33	9	81
17	-7	49
14	-10	100
	Total	392
	$\frac{total}{n}$	$\frac{392}{7} = 56$

# of data

Find Variance using the chart for Sunny Vale.

Temperature	$x - mean$	$(x - mean)^2$
22	$22 - 25 = -3$	9
28	3	9
30	5	25
29	4	16
23	-2	4
21	-4	16
20	-5	25
	Total	104
	$\frac{total}{n}$	$14.85 \div 15$

Find Standard Deviation

GB = $\sqrt{\text{variance}}$ SV = $\sqrt{15}$

$= \sqrt{56}$ $\doteq 4$

$\doteq 7$

What does your analysis show?

GB the temperatures are more spread out

mean

17 ← 24 → 31

68% of the temp. are between 17 and 31.

Seatwork / Homework

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