MEASURES OF VARIATION

– measure the "spread" of the data

"Range – Highest value – Lowest Value

$$\underline{Bl\ 3} \qquad \underline{Bl\ 4}$$
$$74 - 101 \qquad 56 - 78$$

Range = 101-74 96 78-56
= 27   = 22

* most affected by an extreme value

*<u>Standard Deviation</u> – the "average" of how much each piece of data varies from the mean

$$\{6, 8, 9, 11, 12, 28, 34, 36\}$$
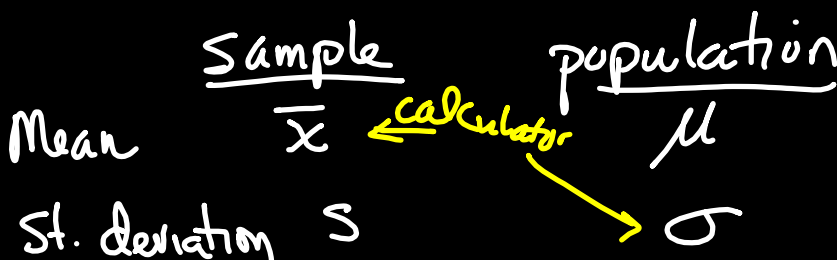
$$\overline{x} = \frac{144}{8} = 18$$

6-18 8-18

$$(-12)^2 + (-10)^2 + (-9)^2 + (-7)^2 + (6)^2 + (10)^2 + (16)^2 + (18)^2$$

Calculator: $12^2 + 10^2 + 9^2 + \ldots = 1090$

$$\frac{1090}{8} = \sqrt{136.25} \approx 11.67$$
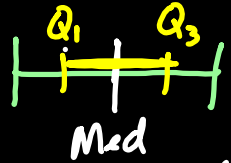
1) Find mean

2) Data – mean

3) Square the differences

4) Find the mean of the squared #'s

5) Square root of mean

	Sample	population
Mean	$\overline{x}$ ← calculator	μ
St. deviation	S	σ

MEASURES OF VARIATION

③ ## IQR & Box & Whisker Plots

Interquartile Range $= Q_3 - Q_1$

Med

Nancy's Bowling Scores

```
12 | 5
13 | 7 8 8
14 | 0 2 2 4 | 8 9
15 | 1 3 3 4 7 8
16 |②5 6 6 7
17 | 0 1 2 2|2 9
18 | 5 6 6 .
19 | 0 2 .
20 |
21 | 9 .
```

$12|5 = 125$
33 Scores

$$\text{Median} = \frac{33}{2} = 16.5 = 17^{th}$$
$$= 162$$

$$\text{Quartiles} = \frac{16}{2} = 8^{th} \text{ \& } 9^{th}$$

$$Q_1 = \frac{144 + 148}{2} = 146$$

$$Q_3 = 172$$

$$IQR = Q_3 - Q = 172 - 146 = 26$$

Box-and-Whisker Plot


```
125        146   162  172      192      219
120    140    160    180    200    220
```
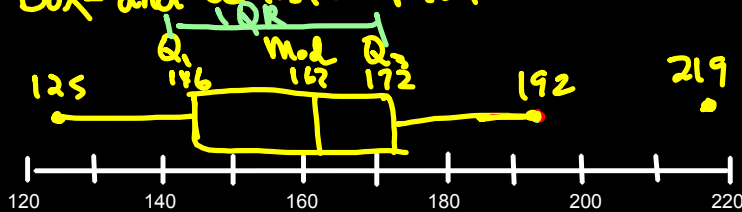
Outliers

1) $IQR * 1.5 = \#$
   $26 * 1.5 = 39$

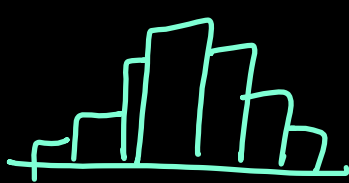   Outlier boundaries

2) Upper boundary
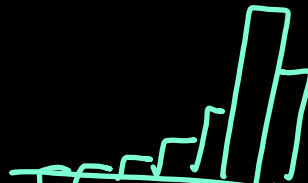 $Q_3 + \# =$
   $172 + 39 = 211$

3) Lower boundary
   $Q_1 - \#$
   $146 - 39 = 107$

Outliers

219

Mean/Standard Dev.

Median/IQR

Median/IQR