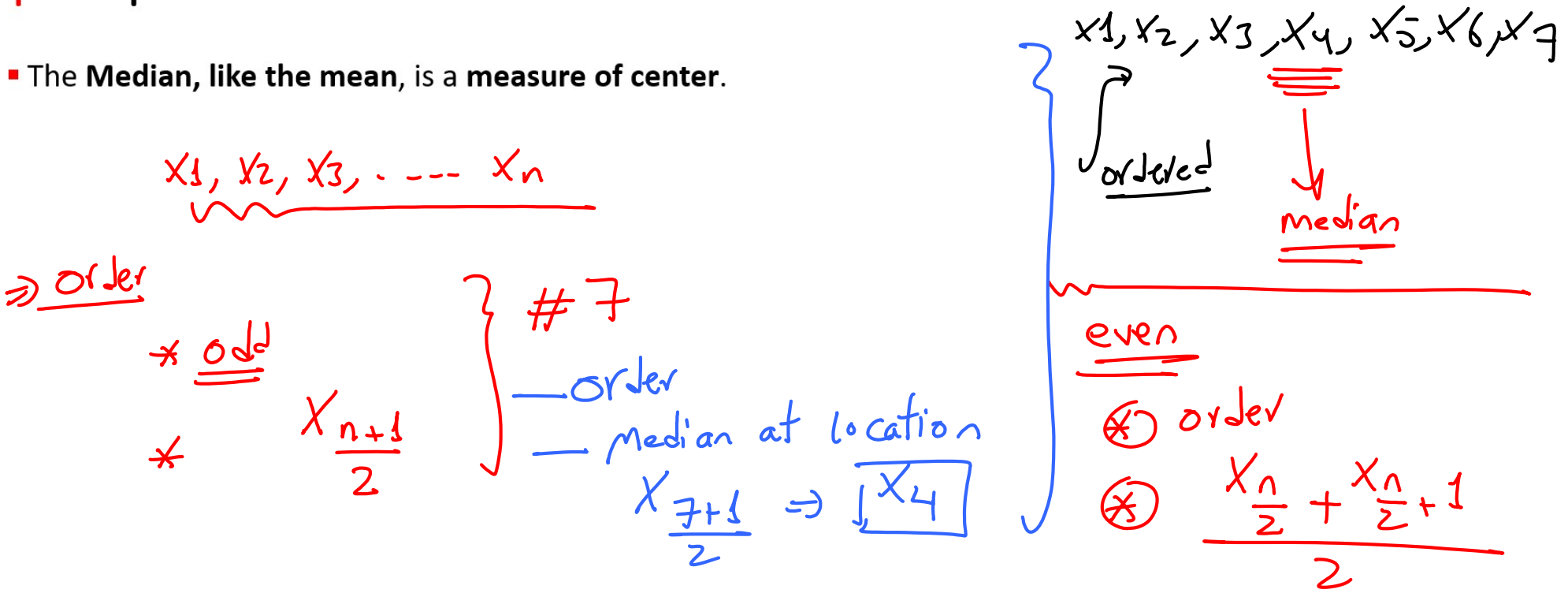
Sample Median

- The **Median, like the mean**, is a **measure of center**.



- A simple random sample of five men is chosen from a large population of men, and their heights are measured. The five heights (in inches) are 65.51, 72.30, 68.31, 67.05, and 70.68. Find the sample median for the height data

65.51, 67.05, 68.31, 70.68, 72.30

median = 68.31

#5

median at location = $\frac{5+1}{2} = x_3$

Mean or Median?

- The median is often used as a measure of center for samples that contain outliers
- To see why, consider the sample consisting of the values **1, 2, 3, 4, and 20**. The mean is **6**, and the **median is 3**.

outlier

1, 2, 3, 4

$\text{mean} = \frac{1+2+3+4}{4} = 2.5$

median = 2.5

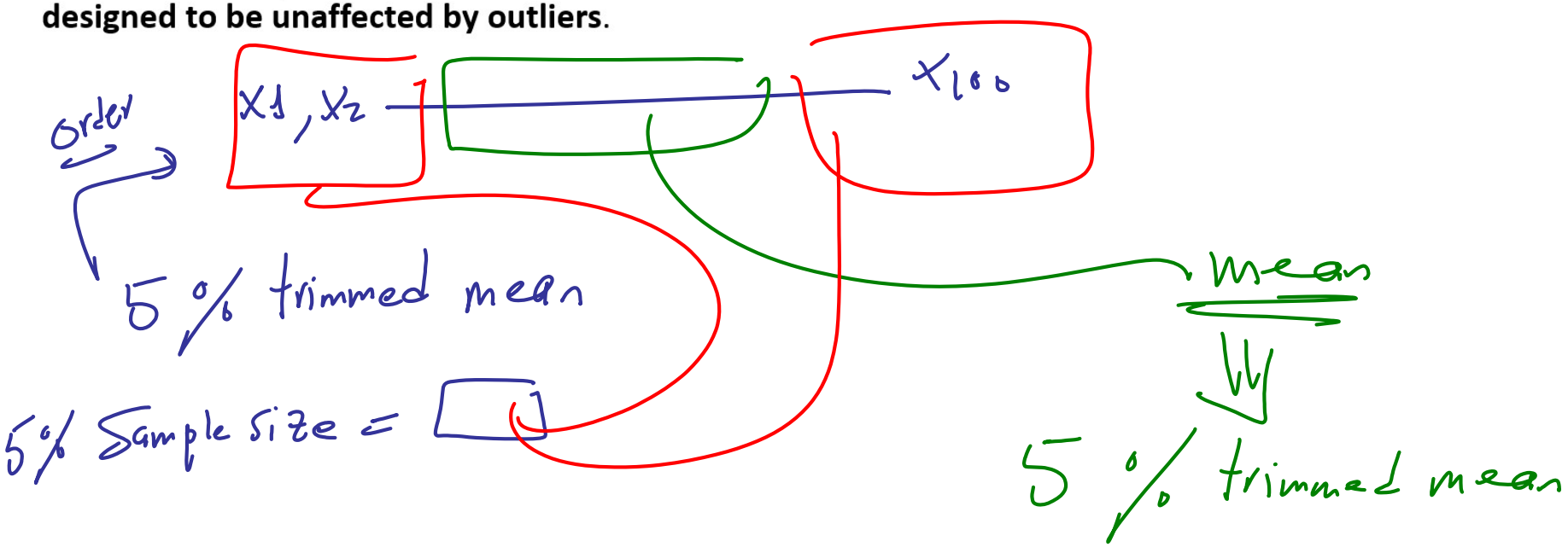
1, 2, 3, 4, 20

$\text{mean} = \frac{30}{5} = 6$

median = 3

Trimmed Mean

- Like the **median**, the **trimmed mean** is a **measure of center that is designed to be unaffected by outliers**.



In the article "Evaluation of Low-Temperature Properties of HMA Mixtures" (P. Sebaaly, A. Lake, and J. Epps, *Journal of Transportation Engineering*, 2002: 578–583), the following values of fracture stress (in megapascals) were measured for a sample of 24 mixtures of hot-mixed asphalt (HMA).

30	75	79	80	80	105	126	138	149	179	179	191
223	232	232	236	240	242	245	247	254	274	384	470

Compute the mean, median, and the 5%, 10%, and 20% trimmed means.

$$\text{mean} = \sum_{i=1}^{24} x_i / 24 = 195.42$$

median → ordered → #24

$$\left(x_{\frac{n}{2}} + x_{\frac{n}{2}+1}\right)/2 \Longrightarrow \frac{x_{12} + x_{13}}{2} \Rightarrow \frac{191 + 223}{2} = 207$$

In the article "Evaluation of Low-Temperature Properties of HMA Mixtures" (P. Sebaaly, A. Lake, and J. Epps, *Journal of Transportation Engineering*, 2002: 578–583), the following values of fracture stress (in megapascals) were measured for a sample of 24 mixtures of hot-mixed asphalt (HMA).

70	75	79	80	80	105	126	138	149	179	179	191
223	232	232	236	240	242	245	247	254	274	284	470

Compute the mean, median, and the 5%, 10%, and 20% trimmed means.

Sample size = 24

5% (24) = 1.2 observation

↓ Round ⇒ 1

5% trimmed mean = $\frac{75+79+\cdots+384}{22}$ = 190.45

10% (24) = 2.4

↓ Round ⇒ 2

10% trimmed mean

= $\frac{79+80+\cdots+274}{20}$

= 186.55

20% (24) = 4.8

↓ 5

20% trimmed = $\frac{105+\cdots+245}{14}$

= 194.07