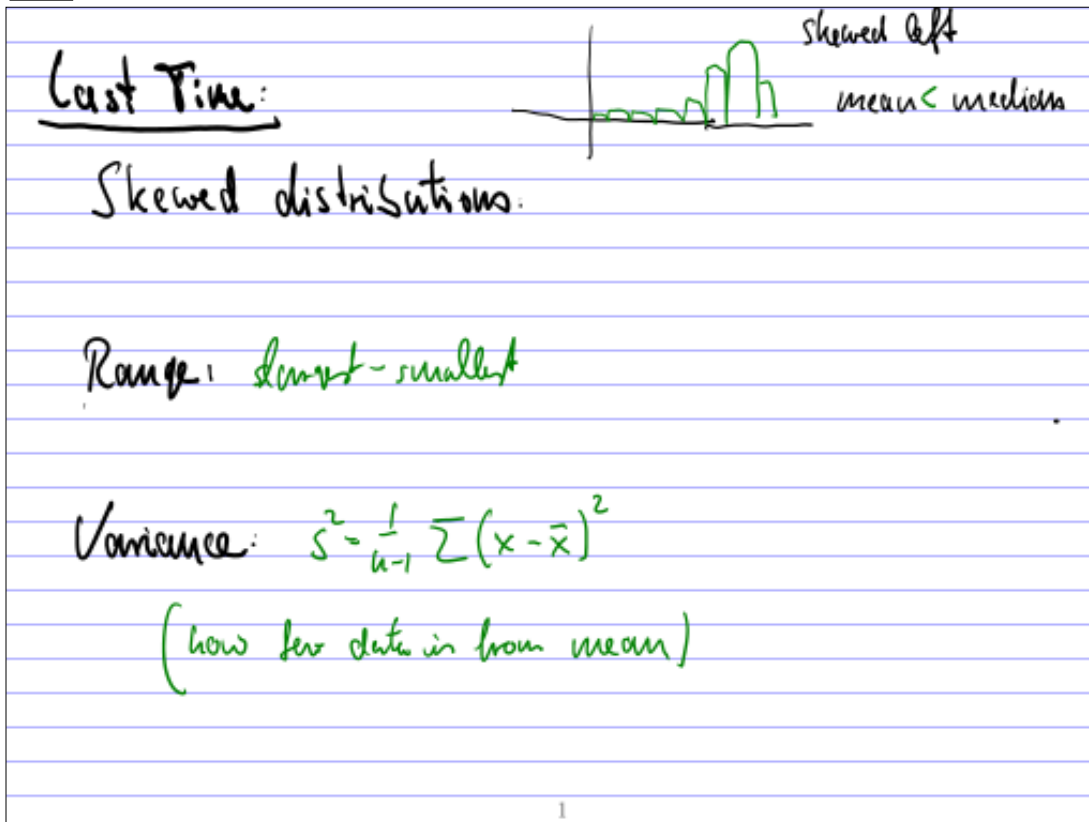
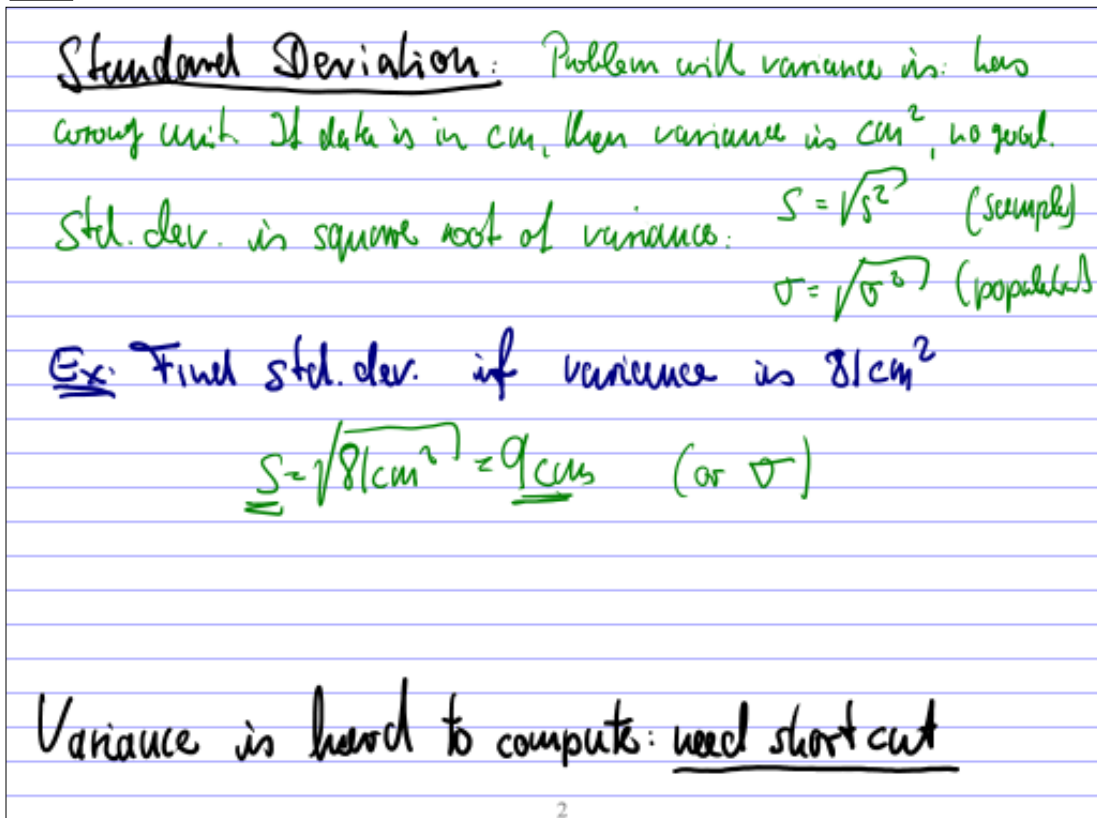


Panel 1



Panel 2



Panel 3

Alternate formula for Variance:

$$S^2 = \frac{1}{n-1} \sum (x - \bar{x})^2 = \frac{1}{n-1} \left[\sum x^2 - \frac{(\sum x)^2}{n} \right]$$

↑ no \bar{x} necessary

Data: 3, 4, 2, 1, 9, 8 Find std. dev. S , using the new shortcut.

x	x^2
3	9
4	16
2	4
1	1
9	81
8	64
<u>32</u>	<u>220</u>

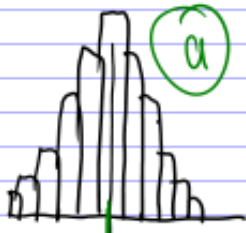
$$S^2 = \frac{1}{n-1} \left(\sum x^2 - \frac{(\sum x)^2}{n} \right) = \frac{1}{5} \left(220 - \frac{32^2}{6} \right) = \underline{\underline{12.8}}$$

$S = 3.54$

3

Panel 4

Variance shows: how spread-out data is

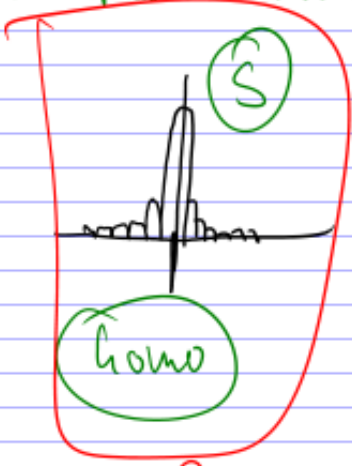


(a)

medium S


a) hetero

(S) homo



(b)

homo



(c)

large S

hetero

Smallest std. dev. ↑

4

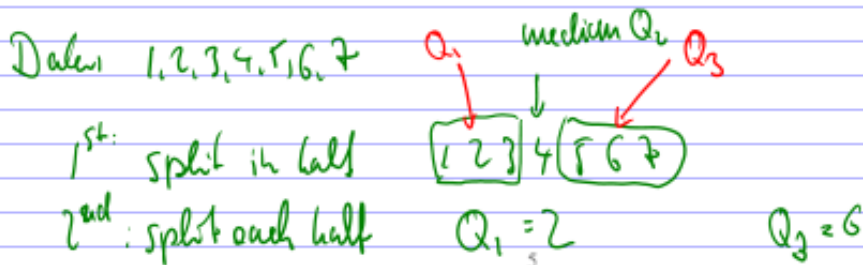
Panel 5

How numeric data descriptorsQuartiles

Lower Quartile Q_1 is that number such that 25% of data is less, 75% is more than Q_1

Upper Quartile Q_3 is that number such that 75% is less, 25% bigger

(Note: $Q_2 = \text{median}$)



Panel 6

How to find Quartiles

- ① Sort data, smallest to largest
- ② Find N (amount of #'s)
- ③ Compute position $L_1 = 0.25 \cdot N$
 if L_1 is whole, pick # between L_1 and next position
 if L_1 is decimal, pick that number at next pos
- ④ Compute $L_3 = 0.75 \cdot N$ pos
 if L_3 whole, pick between L_3 and next position
 if L_3 is decimal, pick that number at next pos
- ⑤ For Q_2 , use $L_2 = 0.5 \cdot N$

Panel 7

Ex: Data 1, 2, 3, 4, 5 sorted, $N=5$. Find quartiles

$L_1 = 0.25 \cdot N = 1.25 \rightarrow$ pick 2nd #: $Q_1 = 2$

$L_2 = 0.75 \cdot N = 3.75 \rightarrow$ pick 4th #: $Q_3 = 4$

$0.5 \cdot 5 = 2.5 \rightarrow$ pick 3rd #: $Q_2 = 3$

Ex: Level of cobine at 11 students is:

0, 97, 103, 253, 1, 103, 123, 265, 1, 112, 198

0 1 1 97 103 112 123 123 198 253 265 (N=11)

$L_1: 0.25 \cdot 11 = 2.75 \rightarrow 3^{rd}$: $Q_1 = 1$

$L_2: 0.5 \cdot 11 = 5.5 \rightarrow 6^{th}$: $Q_2 = 112$

$L_3: 0.75 \cdot 11 = 8.25 \rightarrow 9^{th}$: $Q_3 = 198$

Panel 8

We have several numeric descriptors - want to combine them into one picture:

43	51	53	55	57	58	58	59	60	61
61	61	61	61	62	63	64	64	65	65
65	66	66	66	66	66	66	67		

$Q_1 = 58.5, Q_2 = 61.5, Q_3 = 65.5$

- Draw a line from smallest to largest horizontally
- Draw 3 vertical lines at Q_1, Q_2, Q_3
- Turn into a box

