

# Statistics

## Lecture 8



Feb 19-8:47 AM

Consider the Sample below

2 3 3 3 4

5 5 5 8 10

$$1) n = 10$$

$$2) \text{Mode} = 3 \text{ \& } 5$$

$$3) \text{Range} = 10 - 2 = 8$$

$$4) \text{Midrange} = \frac{10+2}{2} = 6$$

$$5) \sum x = 48$$

$$6) \sum x^2 = 286$$

$$7) \bar{x} = \frac{\sum x}{n} = \frac{48}{10} = \boxed{4.8}$$

Sample Mean

$$8) S^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)}$$

Sample Variance

$$= \frac{10 \cdot 286 - 48^2}{10(10-1)}$$

$$= \frac{556}{90} = 6.17$$

Round to

whole 6

1-Dec. 6.2

2-Dec. 6.18

3-Dec. 6.178

$$8) S = \sqrt{S^2} = \sqrt{6.178} \approx \boxed{2.486}$$

Sample  
Standard  
Deviation

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How to estimate Sample standard deviation

$$S \approx \frac{\text{Range}}{4}$$

Range rule-of-thumb

A sample has a min. of 25 and max. of 75.

1) Range =  $75 - 25 = 50$       2) Midrange =  $\frac{75 + 25}{2} = 50$

3) Estimate S       $S \approx \frac{\text{Range}}{4} = \frac{50}{4} = 12.5$

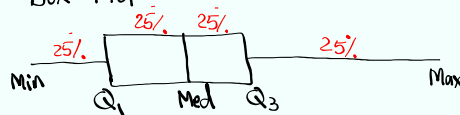
Sep 9-9:01 AM

5 - Number Summary

Min.     $Q_1$     Med.     $Q_3$     Max

It divides the sorted data in 4 groups  
each group contain 25% of the sample.

Draw Box Plot



$$\text{IQR (Inter-Quartile-Range)} = Q_3 - Q_1$$

3rd Quartile
First Quartile

$$\text{Upper Fence} = Q_3 + 1.5(\text{IQR})$$

$$\text{Lower Fence} = Q_1 - 1.5(\text{IQR})$$

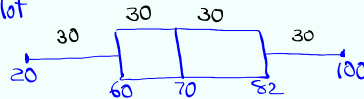
Anything below lower fence or  
above upper fence is outlier.

Sep 9-9:06 AM

I randomly selected 120 exams, the 5-Number Summary of Scores were

$20$     $60$     $70$     $82$     $100$     $\rightarrow \frac{120}{4} = 30$   
 ↑   ↑   ↑   ↑   ↑  
 Min    $Q_1$    Med.    $Q_3$    Max

Draw Box Plot



$$IQR = Q_3 - Q_1 = 82 - 60 = 22$$

$$\begin{aligned} \text{Upper Fence} &= Q_3 + 1.5(IQR) \\ &= 82 + 1.5(22) = 115 \end{aligned}$$

$$\begin{aligned} \text{Lower Fence} &= Q_1 - 1.5(IQR) \\ &= 60 - 1.5(22) = 27 \end{aligned}$$

20 to 27 are outliers



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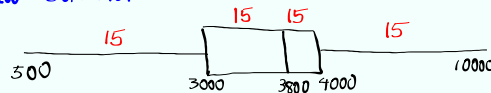
60 nurses were randomly selected.

The 5-Number Summary of their monthly Salaries were

$500$     $3000$     $3800$     $4000$     $10000$   
 ↑   ↑   ↑   ↑   ↑  
 Min.    $Q_1$    Med.    $Q_3$    Max

$$\rightarrow \frac{60}{4} = 15$$

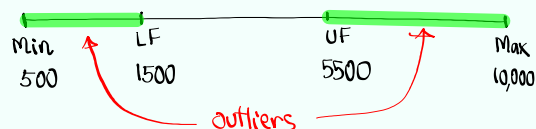
Draw Box Plot



$$IQR = Q_3 - Q_1 = 4000 - 3000 = 1000$$

$$\begin{aligned} \text{Upper Fence} &= Q_3 + 1.5(IQR) = 4000 + 1.5(1000) \\ &= 5500 \end{aligned}$$

$$\begin{aligned} \text{Lower Fence} &= Q_1 - 1.5(IQR) = 3000 - 1.5(1000) \\ &= 1500 \end{aligned}$$



Sep 9-9:21 AM

TI Instructions:

1) To clear the Screen

`clear`

2) To quit

`2nd` `MODE`

3) To clear all lists

`2nd` `+` `4:clearAllLists`  
`Enter`

4) To reset all lists

`STAT` Edit

`5:SetupEditor` `Enter`

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How to Store data in a list

Store the following in L1

18 12 8 20 25

10 5 30 20 28

`STAT` Edit

`1>Edit`

quit & clear the Screen

`2nd` `Mode` `clear`

L1	
18	<code>enter</code>
12	<code>enter</code>
⋮	
28	<code>enter</code>

Sep 9-9:35 AM

How to sort a list:

[STAT] Edit [2nd] [1] [Enter]  
 [2:SortA] L1

Let's view L1:

[2nd] [1] [Enter]

{5 8 10 12 --- 30}  
 ↗ ↗ ↗  
 ↖ ↖ ↖

quit & clear the Screen

[2nd] [Mode] [clear]

Sep 9-9:40 AM

How to find  $\bar{x}$  &  $S$  using TI:

[STAT] [→] CALC  
 1: 1-Var Stats  
 $\bar{x} = 17.6$   
 $S = S_x = 8.618$

with Menu List: L1  
 FreqList: [clear]  
 [Calculate]

without Menu L1 [Enter]

what about  $S^2$ ? [VARS]  
 5: Statistics  
 3:  $S_x^2$   
 [1] [Enter]

quit & clear Screen

[2nd] [Mode] [clear]

74.26  
 Convert this to a reduced fraction

[MATH] 1:  $\frac{\square}{\square}$  [Enter]  
 114 / 15

Sep 9-9:46 AM

Clear all lists:

**2nd** **+** **4:Clear All Lists** **Enter**

Reset all lists:

**STAT** **Edit** **Enter**  
**5:Set Up Editor**

Sep 9-9:57 AM

Store the following in L1:

28 17 35 40

20 50 18 30

quit & clear Screen

**STAT** **Edit**  
**1:Edit**

L1
28
17
35
⋮
30

view L1:

**2nd** **1** **Enter**

{28 17 35 ... 30}  
 → → →

Sep 9-10:00 AM

Sort L1 & view again.

STAT Edit      2nd 1 Enter  
2:SortA(      2nd 1 Enter  
L1

2nd 1 Enter    { 17   18   20   . . . 50 }  
→ → →

Sep 9-10:03 AM