Statistics

Lecture 4

Feb 19-8:47 AM

Consider the Sample below

2 3 3 3 4

5 5 5 8 10

1) $n = 10$

2) Range $= 10 - 2 = 8$

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

4) Mode $3 \& 5$

5) $\sum x = 48$

6) $\sum x^2 = 286$

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

$\bar{x}$: Sample Mean

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

s^2: Sample Variance

$s^2 = \frac{10 \cdot 286 - 48^2}{10(10-1)} = \frac{556}{90} = 6.1\overline{7}$

9) $s = \sqrt{s^2} = \sqrt{6.178} \approx \boxed{2.486}$

s: Sample Standard deviation

whole 6

1-Dec. 6.2

2-Dec. 6.18

3-Dec. 6.178

Sep 9-12:11 PM

How to estimate Sample standard deviation:

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

Range Rule-of-thumb

Given a Sample has a min. of 25 and a max. of 75.

Range = 75 − 25 = 50 Midrange = $\frac{75+25}{2}$ = 50

Estimate $s \approx \frac{\text{Range}}{4} = \frac{50}{4} = 12.5$

Sep 9-12:23 PM

5 – Number Summary

Min Q_1 Med. Q_3 Max

It divides the sorted data into 4 groups.

Each group contains 25% of data.

Q_1 First Quartile Q_3 Third Quartile

Draw Box Plot

IQR (Inter-Quartile-Range) = $Q_3 - Q_1$

Upper Fence = $Q_3 + 1.5(IQR)$

Lower Fence = $Q_1 - 1.5(IQR)$

Min. — Lower Fence

Upper Fence — Max outlier

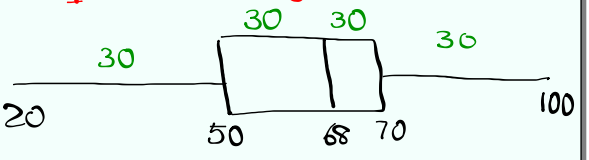
Sep 9-12:28 PM

A sample of 120 exams had the following 5-Number Summary for Scores

$\frac{120}{4} = 30$

20	50	68	70	100
Min.	Q_1	Med.	Q_3	Max

Box Plot



$IQR = Q_3 - Q_1 = 70 - 50 = \boxed{20}$

Upper Fence $= Q_3 + 1.5(IQR) = 70 + 1.5(20) = 100$

Lower Fence $= Q_1 - 1.5(IQR) = 50 - 1.5(20) = 20$

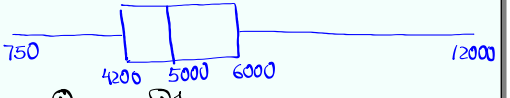
No Outliers

Sep 9-12:35 PM

I randomly selected 60 nurses. The 5-Number Summary for monthly Salaries were

750	4200	5000	6000	12000
Min	Q_1	Med.	Q_3	Max

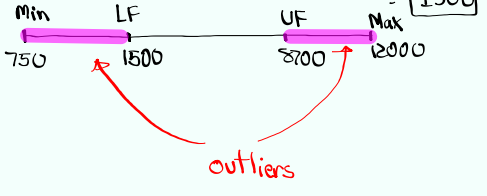
Draw Box Plot.



$IQR = Q_3 - Q_1 = 6000 - 4200 = 1800$

Upper Fence $= Q_3 + 1.5(IQR) = 6000 + 1.5(1800) = \boxed{8700}$

Lower Fence $= Q_1 - 1.5(IQR) = 4200 - 1.5(1800) = \boxed{1500}$



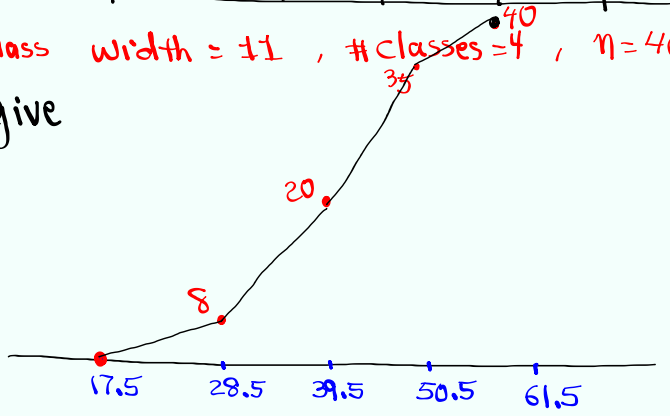
Sep 9-12:42 PM

Complete the chart below Rel.F = $\frac{f}{40}$

class limits	class BNDRS	class MP	Class F	Cum. F	Rel.F	%F
18 – 28	17.5 – 28.5	23	8	8	.20	20%
29 – 39	28.5 – 39.5	34	12	20	.30	30%
40 – 50	39.5 – 50.5	45	15	35	.375	37.5%
51 – 61	50.5 – 61.5	56	5	40	.125	12.5%

class width = 11 , # classes = 4 , n = 40

Ogive



Sep 9-12:50 PM

Consider the Sample below

18	20	23	25	30
32	35	35	38	40
40	40	43	45	48
49	52	54	56	56
60	63	65	70	72

1) $n = 25$

2) Range = 54

3) Midrange = 45

4) Estimate S

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

$= \frac{54}{4} = \boxed{13.5}$

5) How many data elements are below 40? 9

6) What percent of data elements are below 40? $\frac{9}{25} \cdot 100 = \boxed{36\%}$

Sep 9-1:04 PM

18	20	23	25	30
32	35	35	38	40
40	40	43	45	48
49	52	54	56	56
60	63	65	70	72

Make Stem Plot

1	8
2	0 3 5
3	0 2 5 5 8
4	0 0 0 3 5 8 9
5	2 5 6 6
6	0 3 5
7	0 2

Sep 9-1:11 PM

A certain Sample had a symmetric data dist. with $\bar{x} = 125$ and $S = 12.5$.

1) Find its usual Range $\bar{x} \pm 2S$

95% Range $= 125 \pm 2(12.5)$

$= 125 \pm 25 \Rightarrow$ 100-150

2) What % of this Sample are more than 100?

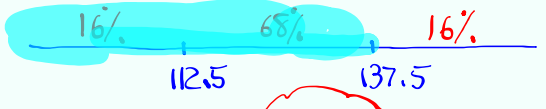
97.5%

3) What % of this Sample are below 137.5?

68% Range

$\bar{x} \pm S$

$125 \pm 12.5 \Rightarrow$ 112.5-137.5



84%

Sep 9-1:13 PM

TI Instructions:

1) To clear the Screen. [Clear]

2) To quit. [2nd] [MODE]

3) To clear all lists.
[2nd] [+] [4:Clear AllLists] [Enter]

4) To reset all lists.
[STAT] Edit [Enter]
[5:SetUpEditor]

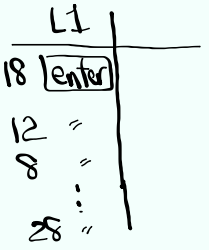
Sep 9-1:39 PM

How to store data in a list:

Store the following in L1:

18 12 8 20
15 30 25 28

[STAT] Edit
[1:Edit]



quit & clear the Screen

[2nd] [Mode] [Clear]

How to view L1:

[2nd] [1] [Enter]
L1

{18 12 8 20...28}

Sep 9-1:45 PM

How to Sort a list:

STAT Edit 2:SortA(2nd 1 Enter

L1

Let's view L1

2nd 1 Enter {8 12 15 ... 30} → → →

Quit & clear the Screen

2nd MODE clear

Sep 9-1:51 PM

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

STAT → CALC 1:1-Var Stat 2nd 1

$\bar{x}$ = 19.5

$S = S_x = 7.783$

Min = 8

Q_1 = 13.5

Med = 19

Q_3 = 26.5

Max = 30

with Menu: List: L1, FreqList: Clear, Calculate

No Menu: L1 Enter

what about S^2?

VARS 5:Statistics 3:S_x

x^2 Enter 60.57142857

MATH 1:▶Frac Enter $\frac{424}{7}$

Convert to reduced fraction

Clear the Screen

clear

Clear all lists

2nd + 4:clear All lists Enter

clear Screen again

clear

Sep 9-1:56 PM

I randomly selected 15 Students. Here are their ages.

25	28	18	32	20
19	24	40	34	52
48	38	50	46	45

Store in L1

Stat Edit

1: Edit

L1
25 Enter
28 "
18 "
⋮
45 "

Let's quit

2nd MODE

Sep 9-2:09 PM

Sort L1, then view it

STAT Edit

2: SortA(

2nd 1 Enter

2nd [Enter

{18 19 20 24 . . . 52}

Sep 9-2:16 PM

Find $\bar{x}$ & s.

STAT → CALC

2nd [1]

1: 1-Var Stats

with Menu

List: L1

Freq List: clear

Calculate

no Menu

L1

Enter

$\bar{x} = 34.6$

$S = S_x = 11.909$

Min = 18

$Q_1 = 24$

Med. = 34

$Q_3 = 46$

Max = 52

Find s^2 in reduced fraction

VARS → 5: Statistics → 3: S_x

x^2 → MATH → 1: ▶Frac → Enter

$\frac{4964}{35}$

Sep 9-2:19 PM

Class Quiz 1

Consider the Sample below

1 3 3 3 9

1) Range $= 9 - 1 = 8$

2) Midrange $= \frac{9+1}{2} = 5$

3) Mode $= 3$

4) $\sum x = 19$

5) $\sum x^2 = 109$

Sep 9-2:28 PM