Statistics

Lecture 4

Feb 19-8:47 AM

I randomly selected 5 students, here are their ages

18 19 20 20 22

1) $n = 5$

2) Range = Max − Min = 22 − 18 = 4

3) Midrange = $\frac{\text{Max} + \text{Min}}{2} = \frac{22+18}{2} = 20$

4) mode = 20

5) Median 20
Value in the middle
"Data must be Sorted"

6) $\sum x = 18 + 19 + 20 + 20 + 22 = 99$

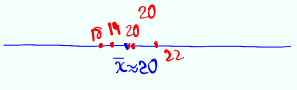
7) $\sum x^2 = 18^2 + 19^2 + 20^2 + 20^2 + 22^2 = 1969$

8) $\bar{x} = \frac{\sum x}{n} = \frac{99}{5}$
$= 19.8$
≈ 20

9) $s^2 = \frac{n\sum x^2 - (\sum x)^2}{n(n-1)}$
$= \frac{5 \cdot 1969 - 99^2}{5(5-1)}$
$= \frac{44}{20} = 2.2$

10) $s = \sqrt{s^2} = \sqrt{2.2}$
≈ 1.483

Since s is small, data elements are close to $\bar{x}$.



Sep 15-10:52 AM

I randomly Selected 40 exams, Scores were symmetric with $\bar{x}=84$ & $S=6$.

Use empirical rule to find

68% Range $\bar{x} \pm S = 84 \pm 6 \rightarrow$ 78 to 90

95% Range $\bar{x} \pm 2S = 84 \pm 2(6) = 84 \pm 12$

Usual Range $\rightarrow$ 72 to 96

95% of 40 = 38

2.5% Unusual | 95% Usual | 2.5% Unusual

72 | 96

1 | Score 38 | 1

99.7% Range $\bar{x} \pm 3S = 84 \pm 3(6) = 84 \pm 18$

$\rightarrow$ 66 to 102

Sep 15-11:22 AM

Ages of students randomly selected had a mean of 30 yrs ($\bar{x}=30$) and standard deviation of 5 yrs ($S=5$) Sample

Maria is 26 yrs old.

1) find her Z-Score $Z = \frac{x-\bar{x}}{S} = \frac{26-30}{5} = \frac{-4}{5} = -.8$

2) usual or unusual age.

Since $-2 \le Z \le 2$ $\rightarrow$ usual age

Jose had a Z-score of 2.4.

1) usual or unusual

Since $Z > 2$ $\rightarrow$ unusual

2) find Jose's age.

$Z = \frac{x-\bar{x}}{S}$

$2.4 = \frac{x-30}{5}$

Cross-multiply

$x-30 = 5(2.4)$

$x-30 = 12$

$x = 12+30$

$x = 42$

Sep 15-11:32 AM

$n = 60$

60 exams were randomly selected, the 5-Number Summarys of Scores were $60 \div 4 = 15$

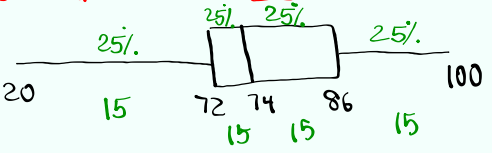
20	72	74	86	100
Min	Q_1	Med	Q_3	Max

Range = Max − Min = 80

Midrange = $\frac{\text{Max} + \text{Min}}{2}$ = 60

$IQR = Q_3 - Q_1 = 86 - 72 = 14$

Box Plot



Upper Fence = $Q_3 + 1.5(IQR) = 86 + 1.5(14) = 107$

Lower Fence = $Q_1 - 1.5(IQR) = 72 - 1.5(14) = 51$

Outliers 20 to 51

Sep 15-11:41 AM

TI instructions:

1) To clear the Screen CLEAR

2) To quit 2nd MODE

3) To clear all lists 2nd + 4:Clear All Lists Enter

4) To reset all lists

STAT Edit 5:Set Up Editor Enter

Sep 15-11:53 AM

How to store data in a list.

Consider the Sample below

1 2 2 2 3

STAT Edit

1:Edit

L1
1
2
2
2
3

Enter

quit & clear Screen

2nd Mode Clear

How to view a list:

2nd 1 (L1) Enter → {1 2 2 2 3}

Sep 15-12:00 PM

How to Find $\bar{x}$ & S:

STAT → CALC

1:1-Var Stats

with Menu

List: L1

FreqList: clear

Calculate

No menu

2nd 1

1-Var Stats

L1 Enter

$\bar{x} = 2$

$S = S_x = .707$

$n = 5$

Min = 1

$Q_1 = 1.5$

Med. = 2

$Q_3 = 2.5$

Max = 3

5-Number Summary

Sep 15-12:05 PM

what about s^2?

VARS | 5: Statistics | 3: S_x | x^2 | Enter

$s^2 = .5$

Write in reduced fraction

MATH | 1: ▶Frac | Enter

$\frac{1}{2}$

Clear all lists ⇒ 2nd | + | 4: clear all lists | Enter

Clear the Screen | Clear

Sep 15-12:13 PM

I randomly selected 10 students, here are their ages:

23	18	30	40	19
20	25	25	42	35

Store in L1.

STAT Edit

1: Edit

L1
23 enter
18 enter
⋮
35 enter

Let's quit

2nd | MODE

Clear the Screen | Clear

Sep 15-12:20 PM

View L1

2nd 1 Enter

{23 18 30 40 35}

How to Sort the data:

STAT Edit 2:SortA(2nd 1 Enter

L1

View L1 again

2nd 1 Enter

{18 19 20 23 25 - - 42}

Sep 15-12:24 PM

Find $\bar{x}$ & S:

STAT → CALC

1:1-Var Stats

with Menu

List: L1

Freq List: Clear

Calculate

2nd 1

No Menu

1-Var Stats

L1

Enter

$\bar{x} = 27.7$

$S = Sx = 8.693$

$n = 10$

Min = 18

$Q_1 = 20$

Med. = 25

$Q_3 = 35$

Max = 42

Sep 15-12:30 PM

Find S^2 in reduced fraction

VARS | 5: Statistics | 3: S_x | χ^2

MATH | 1: ▶Frac | Enter

$$S^2 = \frac{2267}{30}$$

Sep 15-12:35 PM

I randomly selected 6 exams, here are the Scores

10 60 60 70 70 90

1) $n = 6$

2) Range $= 90 - 10 = 80$

3) Midrange $= \frac{90+10}{2} = 50$

4) Mode 60 & 70

5) Median $= \frac{60+70}{2} = 65$

$\Sigma x = 360$ Please

$\Sigma x^2 = 25200$ Verify

6) $\bar{x} = \frac{\Sigma x}{n} = \frac{360}{6} = 60$ ← Mean

7) $S^2 = \frac{n\Sigma x^2 - (\Sigma x)^2}{n(n-1)}$ ← Variance

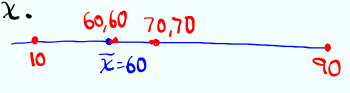
$= \frac{6 \cdot 25200 - 360^2}{6(6-1)}$

$= \frac{21600}{30} = 720$

8) $S = \sqrt{S^2} = \sqrt{720}$

≈ 26.833 ← Standard deviation

Since S is a big number, data elements are not close to $\bar{x}$, they are more spread out from $\bar{x}$.



Sep 15-11:07 AM