

Statistics

Lecture 4



Feb 19-8:47 AM

Class QZ 2

$$n = 8$$

Consider the Sample below

$$\text{Mode} = 3$$

2 3 3 5
8 9 10 12

1) Range = $12 - 2 = 10$

2) Midrange = $\frac{12+2}{2} = 7$

3) $\sum x = 2 + 3 + 3 + 5 + 8 + 9 + 10 + 12 = 52$ $\sum x^2 \neq (\sum x)^2$

4) $\sum x^2 = 2^2 + 3^2 + 3^2 + 5^2 + 8^2 + 9^2 + 10^2 + 12^2 = 436$

$$\bar{x} = \frac{\sum x}{n} = \frac{52}{8} = 6.5$$

$$s^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{8 \cdot 436 - 52^2}{8(8-1)}$$

$$= \frac{784}{56} = 14$$

$$s = \sqrt{s^2} = \sqrt{14} \approx 3.742$$

Estimate S

$$s \approx \frac{\text{Range}}{4} = \frac{10}{4} = 2.5$$

Jun 26-7:02 PM

Some TI instructions:

- 1) To clear the Screen → Clear
- 2) To quit → 2nd MODE
- 3) To clear all lists → 2nd + 4:clearAll Lists
Enter
- 4) To reset all lists → STAT Edit
5:SetupEditor
Enter
- 5) To turn on the diagnostic key →
2nd 0 ↓ ↓ ↓ --- ↓ ▶ Diagnostic On Enter Enter

Jul 1-4:36 PM

How to store data elements in a list.

I randomly selected 10 Students and here are their ages

25 32 18 20 30
28 19 34 45 42

STAT Edit L1
1:Edit
25/Enter
32 "
18 "
...
42/Enter

quit & clear the Screen

2nd MODE Clear

How to view the contents of a list

2nd 1 Enter { 25 32 18 ... 42 }
L1 ← ← ← → → →

How to sort the contents of a list:

STAT Edit 2nd 1 Enter 2:SortA L1 Enter STEM Plot
Let's view L1 { 18 19 20 }
2nd 1 Enter → → →

1|89
2|058
3|024
4|25

quit & clear the Screen

2nd MODE Clear

Data must be sorted.

Jul 1-4:43 PM

How to find \bar{x} , S , and S^2 using TI:

[STAT] → [CALC] → [1: 1-Var Stats] → [List: L1] → [L1] [Enter]

Menu: List: L1, Freq List: [Clear], Calculate: [2nd] [1]

No Menu: L1 [Enter]

$\bar{x} = 29.3$

$S = S_x = 9.298$

For S^2 : [VARS] → [5: Statistics] → [3: S_x^2] → [x^2] [Enter]

$S^2 = 86.45$

To convert to a reduced fraction

[MATH] → [1: Frac] [Enter]

$S^2 = \frac{7781}{90}$ exact value

Clear all lists: [2nd] [+] [4: Clear All Lists] [Enter]

quit [2nd] [MODE]

Clear Screen [Clear]

Jul 1-4:55 PM

I randomly selected 16 exams, and here are the Scores:

72	86	65	100
58	70	90	95
100	80	88	92
78	75	68	75

Store this data set in a list.

[STAT] Edit → [1: Edit]

quit [2nd] [MODE]

View L1 [2nd] [1] [Enter]

{ 72 86 65 ... 68 75 }

L1

72
86
65
⋮
75

Jul 1-5:06 PM

Min = 58
 Q1 = 71
 Med. = 79
 Q3 = 91
 Max. = 100

5-Number Summary

1) Draw Box Plot

2) $IQR = Q_3 - Q_1 = 91 - 71 = 20$

3) Upper fence = $Q_3 + 1.5(IQR) = 91 + 1.5(20) = 121$

4) Lower fence = $Q_1 - 1.5(IQR) = 71 - 1.5(20) = 41$

5) Any outliers?
No outliers

Jul 1-5:27 PM

What about grouped data? 4 classes
CW = 9

class limits	class BNDRS	class MP	class F	Cum. F	Rel. F	%F
20 - 28	19.5 - 28.5	24	3	3	.100	10.0%
29 - 37	28.5 - 37.5	33	7	10	.233	23.3%
38 - 46	37.5 - 46.5	42	15	25	.500	50.0%
47 - 55	46.5 - 55.5	51	5	30	.167	16.7%

$Rel. F = \frac{F}{n} = \frac{F}{30}$
 $n = 30$

what about \bar{x} & s of group data?

clear all lists: [2nd] [t] [4:clear All lists] [Enter]

class MP → L1
class F → L2

L1	L2
24	3
33	7
42	15
51	5

[STAT] → [CALC] → [1:1-Var Stats] → [2nd] [1] → [2nd] [2] → [L1, L2] [Enter] → [7]

$\bar{x} = 39.6$
 $S = S_x = 7.815$
 $S^2 = \frac{8856}{145}$

Jul 1-5:33 PM

Consider the chart below

class MP	class F
18	4
30	8
42	13
54	8
66	7

→

1) 5 classes

2) $n = \sum f = 4 + 8 + 13 + 8 + 7 = 40$

3) Find \bar{x} & S using TI

clear all lists.
class MP → L1
class F → L2

STAT → **CALC**
1: 1-Var Stats

$\bar{x} = 43.8$
 $S_x = 14.772$
 $n = 40$

for S^2

$S^2 = \frac{14184}{65}$

Menu
List: L1
Freq List: L2

No Menu
1-Var Stats
L1, L2
□
Enter

VARS **5: Statistics** **3: Sx** **Calculate** **Enter**

x² **MATH** **1: ▸ S_{sq}** **Enter**

Jul 1-6:01 PM

Working with Order-Pairs:

x	y
2	5
3	8
3	9
4	10
5	10

1) Plot these Points

2) clear all lists, x → L1, y → L2

3) **STAT** → **CALC**
2: 2-Var Stats

$\sum x = 17$ $\sum y = 42$
 $\sum x^2 = 63$ $\sum y^2 = 370$
 $\sum xy = 151$ $n = 5$

Menu
xlist: L1
ylist: L2
Freq List: **clear**

No Menu
L1, L2
□
enter

Calculate

Jul 1-6:13 PM

Complete the chart below

x	y	x ²	y ²	xy
1	3	1	9	3
2	7	4	49	14
4	10	16	100	40
5	12	25	144	60

$n = 4$

clear all lists
 $x \rightarrow L1, y \rightarrow L2$

[STAT] [→] CALC
 2: 2-Varstat

Menu	No Menu
Xlist:L1	L1, L2
Ylist:L2	[enter]
Freqlist:clear	
[Calculate]	

$\sum x = 12$ $\sum y = 32$
 $\sum x^2 = 46$ $\sum y^2 = 302$
 $n = 4$ $\sum xy = 117$

Jul 1-6:22 PM

Draw Scatter Plot

Regression line
 $y = a + bx$

[STAT] [→] CALC

~~4:~~
 8: LinReg(a+bx)

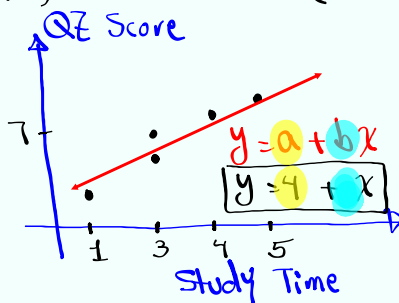
Menu	No Menu
Xlist:L1	L1, L2
Ylist:L2	[enter]
[clear]	
[Calculate]	

$a = 1.7$
 $b = 2.1$
 $r^2 = .959$
 $r = .979$

Jul 1-6:29 PM

I randomly selected 5 students. chart below is study time (hrs) and QZ Score (out of 10)

Study time	QZ Score
3	7
3	6
4	8
1	5
5	9



Study time $\rightarrow x \rightarrow L1$
 QZ Score $\rightarrow y \rightarrow L2$

STAT \rightarrow CALC

8: LinReg(ax+b)

$a = 3.727$ } $a \approx 4$
 $b = 1.023$ } $b \approx 1$
 $r^2 = .920$
 $r = .959$

Xlist: L1 No Memo
 Ylist: L2 L1, L2
 enter

clear
 Calculate

Jul 1-6:38 PM

Consider the STEM Plot below

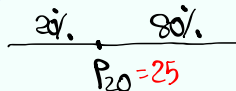
1|89
 2|02558
 3|00235689
 4|03378
 5|2358

1) $n = 24$

2) find P_{20}

$L = \frac{20}{100} \cdot 24$

$= 4.8 \rightarrow L = 5$



$P_{20} = 5\text{th element}$

$= 25$

3) Median = P_{50}

$L = \frac{50}{100} \cdot 24 = 12$

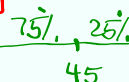
$P_{50} = \frac{12\text{th element} + \text{Next element}}{2}$
 $= \frac{35 + 36}{2} = \boxed{35.5}$



4) find k such that $P_k = 45$

$k = \frac{B}{n} \cdot 100$

$k = \frac{18}{24} \cdot 100$



$\boxed{k = 75}$

Jul 1-6:48 PM

A data set has a symmetric dist. with
 $\bar{x} = 120$, and $S = 15$.

1) 68% Range $\rightarrow \bar{x} \pm S$ $120 \pm 15 \Rightarrow \boxed{105 \text{ to } 135}$

2) Usual Range $\rightarrow \bar{x} \pm 2S$ $120 \pm 2(15) \Rightarrow \boxed{90 - 150}$
 95% Range

3) Z-Score for data element 160.

$$Z = \frac{x - \bar{x}}{S} \quad Z = \frac{160 - 120}{15} \approx \boxed{2.667}$$

unusual

Jul 1-6:57 PM

In-Person QZ 3 (open Notes)

use the data below find

35 28 30 20 25

40 42 38 18 25

1) $\bar{x} = 30.1 \approx \boxed{30}$ } Round to whole #
 2) $S = 8.373 \approx \boxed{8}$ }

3) $S^2 = \frac{701}{10}$ } Reduced Fraction

Jul 1-7:02 PM