

Statistics

Lecture 4



Feb 19-8:47 AM

Class QZ 1

Consider the Sample below: Use Your Calc. to Find

5 8 9 7

8 9 5 10

Clear all lists

[2nd] [+] [4:clear all lists] [Enter]

Reset all lists

[STAT] Edit [Enter]
[5:SetupEditor]

Store the Sample in a list.

[STAT] Edit	L1
[1:Edit]	5
	8
	9
	5
	10

1) $\bar{x}$

2) S

3) S^2

Round to whole#

Reduced fraction

[STAT] [→] CALC

[1:1-Var Stats]

with Menu

List: L1

FreqList: clear

[Calculate]

[2nd] [1]

No Menu

1-Var Stats

L1

[Enter]

Sep 19-7:50 AM

$$\bar{x} \approx 7.625$$

$$\boxed{\bar{x} \approx 8}$$

$$S = S_x = 1.847$$

$$\boxed{S \approx 2}$$

To find S^2 in reduced fraction

VARs **5:Statistics** **3:Sx** **x²** **Math** **1:Frac** **Enter**

$$\boxed{S^2 = \frac{191}{56}}$$

By empirical rule

95% Range (Usual Range) $\bar{x} \pm 2S$

$$= 8 \pm 2(2)$$

$$= 8 \pm 4$$

$$\Rightarrow \boxed{4 \text{ to } 12}$$

Sep 19-8:16 AM

Clear all lists.

Store the Sample below in L1.

72 68 95 70 98

80 85 100 75 90

65 55 84 86 80

100 93 90 88 80

72 77 69 59 65

quit & clear Screen

2nd **MODE** **clear**

Sort **L1**, View **L1**, then make STEM Plot

STAT **Edit** **2nd** **1** **Enter**
2:SortA

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

{55 59 65 → → → 100}

```

5 | 59
6 | 55 89
7 | 0 2 2 5 7
8 | 0 0 0 4 5 6 8
9 | 0 0 3 5 8
10 | 0 0
  
```

Sep 19-8:21 AM

5 | 59
 6 | 55 89
 7 | 02257
 8 | 0004568
 9 | 00358
 10 | 00

Min = 55 Max = 100

Range = $100 - 55 = 45$

Estimate $S \approx \frac{\text{Range}}{4} = \frac{45}{4} = \boxed{11.25}$

Find $\bar{x}$ & S

$\bar{x} = 79.84$

[STAT] → CALC

$S = S_x \approx 12.750$

1:1-Var Stats

$\sigma n = 25$

5-Number Summary

Min = 55

$Q_1 = 69.5 \approx 70$

Med. = 80

$Q_3 = 90$

Max = 100

Find S^2 in reduced frac.

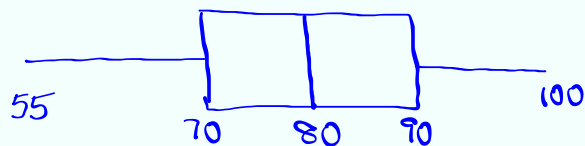
$$S^2 = \frac{48767}{300}$$

Sep 19-8:33 AM

5-Number Summary

55 70 80 90 100

Draw Box Plot



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

$$\text{Upper Fence} = Q_3 + 1.5(IQR) = 90 + 1.5(20) = \boxed{120}$$

$$\text{Lower Fence} = Q_1 - 1.5(IQR) = 70 - 1.5(20) = \boxed{40}$$

Discuss outliers None

Sep 19-8:40 AM

Complete the chart below

class limits	class MP	class F
18 - 30	24	5
31 - 43	37	12
44 - 56	50	8

1) How many classes? 3

2) Class width 13

3) Sample Size n
 $n = \sum f = 25$

How to find $\bar{x}$ & S for grouped data

class MP $\rightarrow$ L1
class F $\rightarrow$ L2

$\bar{x} = 38.56$
 $S = S_x = 9.434$
 $n = 25$
 $S^2 = \frac{13351}{150}$

quit & clear

STAT $\rightarrow$ CALC
1:1-Var Stats

With Menu
List: L1
Freq List: L2
Calculate
Enter
End [1]
End [2]

No Menu
1-Var Stats
L1, L2
Enter
End [1]
End [2]

Sep 19-8:45 AM

Complete the chart below

class limits	class MP	class F	Com. F
18 - 27	22.5	6	6
28 - 37	32.5	10	16
38 - 47	42.5	14	30
48 - 57	52.5	10	40

1) How many classes? 4

2) class width 10

3) $n = \sum f = 40$

class MP $\rightarrow$ L1, class F $\rightarrow$ L2

use 1-Var Stats with L1 & L2

$\bar{x} = 39.5$ $S = 10.178$

$n = 40$

S^2 (Reduced Fraction)
 $S^2 = \frac{4040}{39}$

Sep 19-9:01 AM

5 | 59
6 | 55 89
7 | 0 2 2 5 7
8 | 0 0 0 4 5 6 8
9 | 0 0 3 5 8
10 | 0 0

1) $n = 25$

2) How many data elements are below 80? 11

3) what % of data elements are below 80?

11 is what % of 25? $11 = \frac{P}{100} \cdot 25$

OR

$\frac{11}{25} \cdot 100 = 44\%$

44% 56%

80

Introducing Percentile
Data must be Sorted

Notation P_k

$k\%$ $(100-k)\%$

P_k

in our example

$P_{44} = 80$

44% 56%

80

Sep 19-9:10 AM

How to Find P_k

1) Make sure data is sorted

2) Find location $L = \frac{k}{100} \cdot n$ Sample Size

If L is decimal $\rightarrow$ Round-up to a whole #

$P_k = L$ th element

If L is a whole # $\rightarrow$

$$P_k = \frac{L\text{th element} + \text{Next element}}{2}$$

Sep 19-9:36 AM

5	59
6	55 89
7	02 257
8	000 4568
9	003 58
10	00

$n = 25$

Find P_{20}

$$L = \frac{20}{100} \cdot 25 = 5$$

$$P_{20} = \frac{\text{5th element} + \text{6th element}}{2}$$

$$= \frac{68 + 69}{2} = \boxed{68.5}$$

20% 80%

$P_{20} = 68.5$

find P_{50} Median

$$L = \frac{50}{100} \cdot 25 = 12.5$$

$$L = 13$$

$$P_{50} = 13\text{th element}$$

$$= 80$$

50% 50%

$P_{50} = 80$

Sep 19-9:40 AM

5	59
6	55 89
7	02 257
8	000 4568
9	003 58
10	00

Doing Reverse

Find K such that $P_K = 75$

$K = \frac{B}{n} \cdot 100$ Round to whole %

$$= \frac{9}{25} \cdot 100 = \boxed{36}$$

36% 64%

$P_{36} = 75$

Find K such that $P_K = 90$

$K = \frac{B}{n} \cdot 100 = \frac{18}{25} \cdot 100 = 72$

72% 28%

$P_{72} = 90$

Sep 19-9:45 AM

Consider the stem plot below

For ages of randomly selected students:

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

1) $n = 30$

2) $\text{Range} = 60 - 17 = 43$

3) Estimate $S \approx \frac{\text{Range}}{4}$
 $= \frac{43}{4} = 10.75$

4) Mode $\boxed{43}$

5) Median $P_{50} = \frac{15^{\text{th}} + 16^{\text{th}}}{2} = \frac{37 + 39}{2} = \boxed{38}$
 $L = \frac{50}{100} \cdot 30 = 15$

6) Find the percentile ranking of 50.

Find k such that $P_k = 50$

$k = \frac{13}{n} \cdot 100 = \frac{24}{30} \cdot 100 = 80$
 $\frac{80\%}{\quad} \quad \frac{20\%}{\quad}$
 $P_{80} = 50$

Sep 19-9:51 AM

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

Store in L1

Use 1-Var Stats with L1
to find

$\bar{x} = 36.8$

$S = 13.1$

$S^2 = \frac{149921}{870}$

} Round to
1-dec

} Reduced
Fraction

Sep 19-10:01 AM

1 | 788
2 | 0122558
3 | 023579
4 | 02333589
5 | 02358
6 | 0

Find P_{30}
 $L = \frac{30}{100} \cdot 30 = 9$
 $P_{30} = \frac{9^{\text{th}} + 10^{\text{th}}}{2} = \frac{25 + 28}{2} = 26.5$

Find P_{95}
 $L = \frac{95}{100} \cdot 30 = 28.5 \rightarrow L = 29$
 $P_{95} = 29^{\text{th}} \text{ element} = 58$

Find K Such that $P_K = 25$
 $K = \frac{B}{n} \cdot 100 = \frac{7}{30} \cdot 100 = 23.3 \approx 23$
 $P_{23} = 25$

SG 6, 7, & 8

Sep 19-10:07 AM

Working with ordered Pairs
 (x, y)

x	y	x^2	y^2	xy
1	2	1	4	2
2	5	4	25	10
3	6	9	36	18
5	8	25	64	40

$\sum x = 11$
 $\sum x^2 = 39$
 $n = 4$
 $\sum y = 21$
 $\sum y^2 = 129$
 $\sum xy = 70$

Plot these Points. Scatter Plot

Clear all lists [STAT] → [CALC] 2:2-Var Stats

$x \rightarrow L1$
 $y \rightarrow L2$

With Menu
 $\sum x = 11$
 $\sum y = 21$
 $\sum x^2 = 39$
 $\sum y^2 = 129$
 $n = 4$
 $\sum xy = 70$

No Menu
 $xlist : L1$
 $ylist : L2$
 $FreqList : [clear]$
 $[Calculate]$
 $[enter]$

Sep 19-10:17 AM

Given $(2,5)$, $(1,5)$, $(3,4)$, $(3,6)$, $(5,2)$

i) Complete the chart below

x	y	x^2	y^2	xy
2	5	4	25	10
1	5	1	25	5
3	4	9	16	12
3	6	9	36	18
5	2	25	4	10

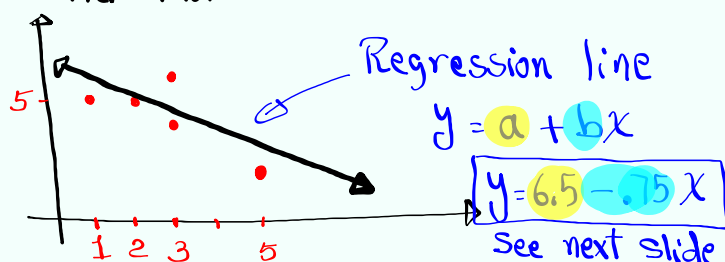
Use 2-Var Stats
with L1 & L2

$$\sum x = 14 \quad \sum y = 22$$

$$\sum x^2 = 48 \quad \sum y^2 = 106$$

$$n = 5 \quad \sum xy = 55$$

Scatter Plot

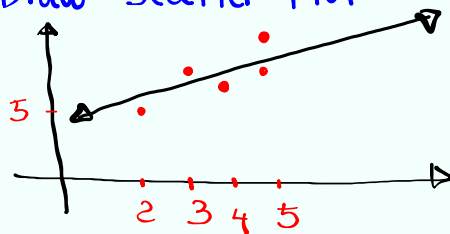


Sep 19-10:29 AM

Given

$(2,5)$, $(3,8)$, $(5,8)$, $(4,7)$, $(5,10)$

Draw Scatter Plot



Regression line

$$y \approx 3 + x$$

a b

$x \rightarrow L1$

$y \rightarrow L2$

Use LinReg(a+bx)
to find

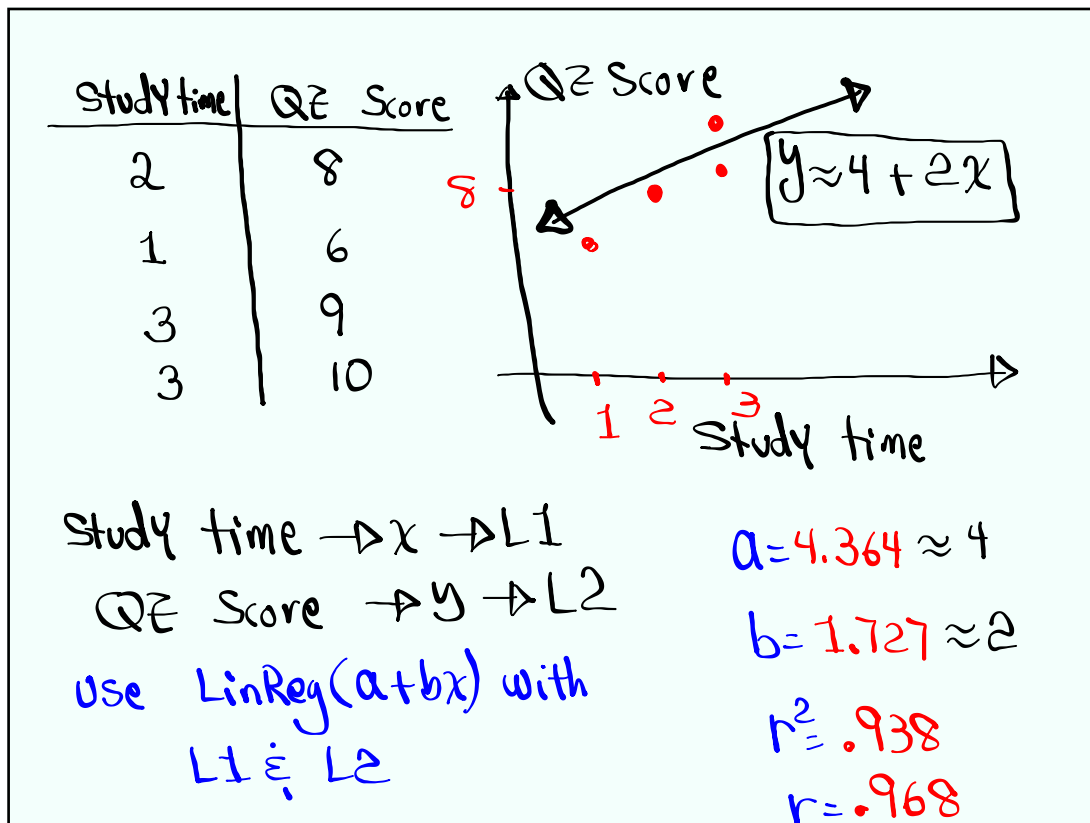
$$a = 3.353 \approx 3$$

$$b = 1.118 \approx 1$$

$$r^2 = .643$$

$$r = .802$$

Sep 19-10:47 AM



Sep 19-10:53 AM

$\boxed{\text{STAT}} \rightarrow \boxed{\text{CALC}}$
 $\vdots$
 $\boxed{8: \text{Lin Reg}(a+bx)}$

with Menu
 x list: L1
 y list: L2
 $\boxed{\text{clear}}$
 $\boxed{\text{Calculate}}$

No Menu
 $\text{LinReg}(a+bx)$
 L1, L2
 $\boxed{\text{Enter}}$

$a = 6.5$
 $b = -.75$
 $r^2 = .538$
 $r = -.734$

If r & r^2 are missing

$\boxed{2nd} \boxed{0} \downarrow \downarrow \downarrow \downarrow \dots \downarrow \boxed{\text{Diagnostic}}$
 $\boxed{\text{Enter}}$
 $\boxed{\text{Enter}}$

Sep 19-10:38 AM