

# Statistics

## Fall 2022

### Lecture 8



Feb 19-8:47 AM

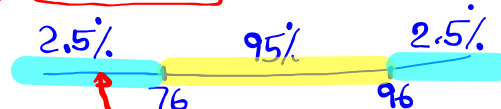
Class QZ 8:

A data set has a bell-shaped dist with  $\bar{x} = 86$  and  $S = 5$ .

1) find its usual Range.

$$\Rightarrow \boxed{76 \text{ to } 96}$$

95% Range



2) find Z-Score for data element 70. Is this data element usual or unusual? why?

$$Z = \frac{x - \bar{x}}{S} = \frac{70 - 86}{5} = \frac{-16}{5} = \boxed{-3.2}$$

it is not within the usual Range  
unusual

Z-Score is not within  $-2 \leq 2$ .

Nov 3-5:36 AM

class QZ 7:

Consider the Sample below Find

15 10 16 18 18

1)  $\bar{x} = 15.7$

14 20 15 15 16

2)  $S = 2.7$

$n = 10$

} Round to  
1-decimal

If we round  $\bar{x}$  &  $S$  to  
whole #  $\Rightarrow \bar{x} = 16, S = 3$

3)  $S^2 = \frac{661}{90}$

} Reduced  
fraction

68% Range  $\Rightarrow \bar{x} \pm S = 16 \pm 3$

$\Rightarrow$  13 to 19

Nov 2-8:06 AM

Consider the chart below

class MP	Class F
17	5
25	12
33	18
41	10
49	5

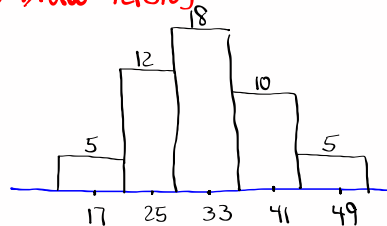
1) class width

$25 - 17 = 33 - 25 = 41 - 33 = 49 - 41 = 8$

2) Sample Size

$n = \sum f = 5 + 12 + 18 + 10 + 5 = 50$

3) Draw histogram



4) use class MP & class F  
to find

$\bar{x} = 32.68$

$S = 8.993$

$n = 50$

Class MP  $\rightarrow$  L1

Class F  $\rightarrow$  L2

1-Var stats with L1 & L2

5) find  $S^2$  in reduced  
fraction.

$S^2 = \frac{99072}{1225}$

Nov 3-6:21 AM

Use the STEM plot below

1	25
2	03469
3	0002899
4	0255578
5	23578
6	0359
7	02

1)  $n = 32$

2) Range =  $72 - 12 = 60$

3) Midrange =  $\frac{72 + 12}{2} = \frac{84}{2} = 42$

4) Mode =  $30 \hat{=} 45$

5) Estimate  $S \approx \frac{\text{Range}}{4} = \frac{60}{4} = 15$

6) Find  $P_{20}$   $P_{20} = 7^{\text{th}} \text{ element} = 29$   
 $L = \frac{20}{100} \cdot 32 = 6.4 \rightarrow L = 7$

7) Find  $P_{50}$   $P_{50} = \frac{16^{\text{th}} \text{ element} + \text{Next element}}{2} = \frac{42 + 45}{2} = 43.5 \rightarrow \text{Median}$   
 $L = \frac{50}{100} \cdot 32 = 16$

8) Find percentile ranking for 60, that is find  $K$   
 Such that  $P_K = 60$   
 $K = PR = \frac{B}{n} \cdot 100$  (Below)  
 Round to whole %.  
 Sample Size

$K = \frac{26}{32} \cdot 100 = 81.25$   
 $K = 81 \rightarrow P_{81} = 60$   
 81%      19%  
 $P_{81} = 60$

Nov 3-6:31 AM

Complete the chart below

x	y	x <sup>2</sup>	y <sup>2</sup>	xy
✓ 1	4	1	16	4
✓ 2	7	4	49	14
✓ 2	8	4	64	16
✓ 3	10	9	100	30

$\sum x = 8$        $\sum y = 29$

$\sum x^2 = 18$        $\sum y^2 = 229$

$n = 4$        $\sum xy = 64$

Clear all lists.  
 $x \rightarrow L1, y \rightarrow L2$   
**STAT**  $\rightarrow$  **CALC**  
**2: 2-Var Stats**

With Menu:  $x$  list: **L1**  
 $y$  list: **L2**  
 Freq List: **clear**  
**Calculate**

No Menu: 2-Var Stats  
**L1, L2**  
**Enter**

Plot the Points below:

Scatter Plot

Nov 3-6:50 AM

Consider the points below

x	y
✓ 1	8
✓ 2	6
✓ 3	6
✓ 4	5
✓ 6	3

1) Draw Scatter Plot

2) Use 2-Var Stats to find

$$\sum x = 16 \quad \sum y = 28$$

$$\sum x^2 = 66 \quad \sum y^2 = 170$$

$$n = 5 \quad \sum xy = 76$$

3) Compute  $\sqrt{n\sum x^2 - (\sum x)^2}$

$$= \sqrt{5 \cdot 66 - 16^2} = \sqrt{74} \approx 8.602$$

4) Compute  $\sqrt{n\sum y^2 - (\sum y)^2}$

$$= \sqrt{5 \cdot 170 - 28^2} = \sqrt{66} \approx 8.124$$


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Perform the following steps in your calc.:

2nd [0] ↓ ↓ ↓ ↓ ... ↓ Diagnostic On [Enter] [Enter]

Nov 3-7:01 AM

Consider the points below

x	y
2	5
3	7
3	8
4	9
5	10

1) Draw Scatter Plot

2) Use 2-Var Stats for  $x \rightarrow L1, y \rightarrow L2$  to find

$$\sum x = 17 \quad \sum y = 39$$

$$\sum x^2 = 63 \quad \sum y^2 = 319$$

$$n = 5 \quad \sum xy = 141$$

How to find equation of the regression line using TI:

STAT → CALC

8: LinReg(a+bx)

with Menu: xlist: L1, Ylist: L2, Anything else → clear, Calculate

No Menu: LinReg(a+bx), L1, L2, Enter

a = 2.308

b = 1.615

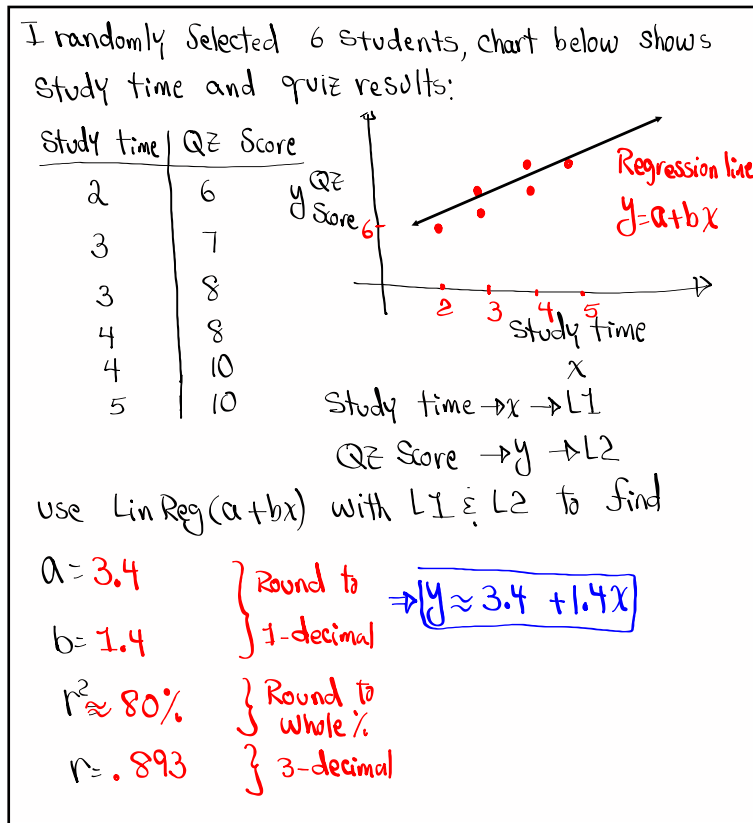
r<sup>2</sup> = .917

r = .958

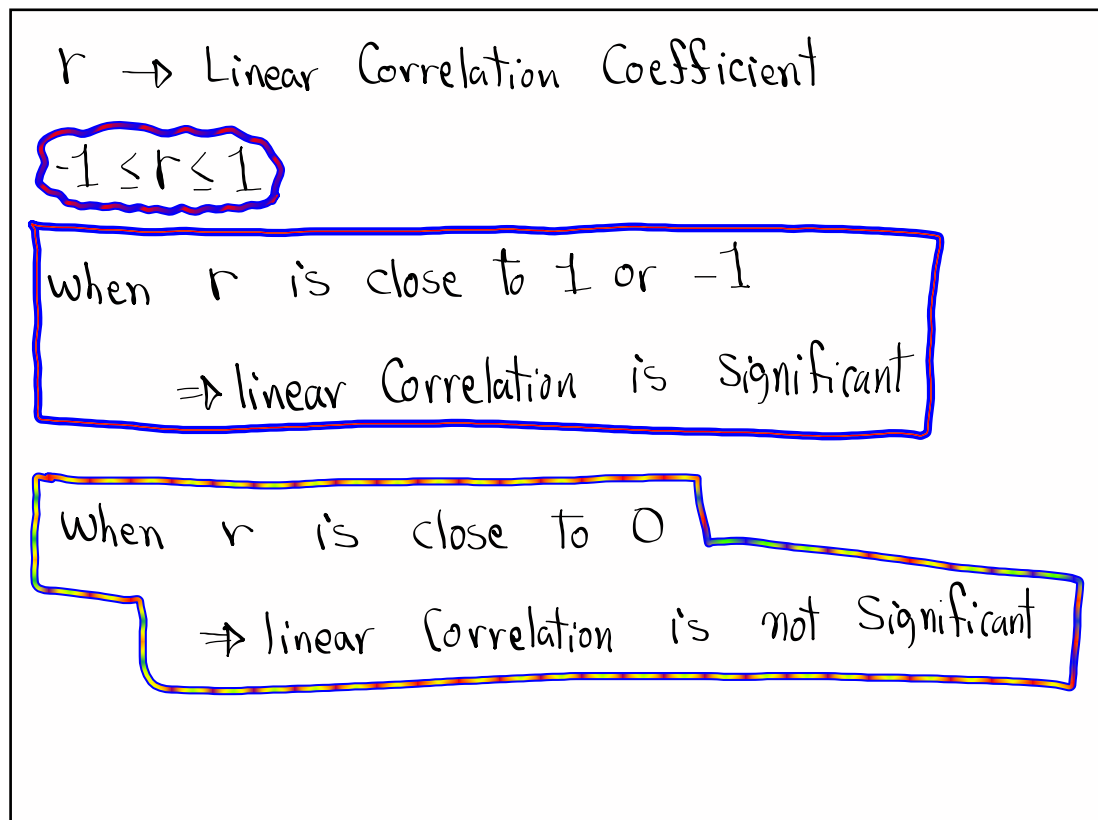
Regression line

$$y = 2.308 + 1.615x$$

Nov 3-7:28 AM



Nov 3-7:42 AM



Nov 3-7:51 AM

$r^2 \rightarrow$  Coefficient of determination

Always express as whole%.

$r^2$  tells us what% of Y-values are explained by X-values.

using last example

$r^2 \approx 80\%$

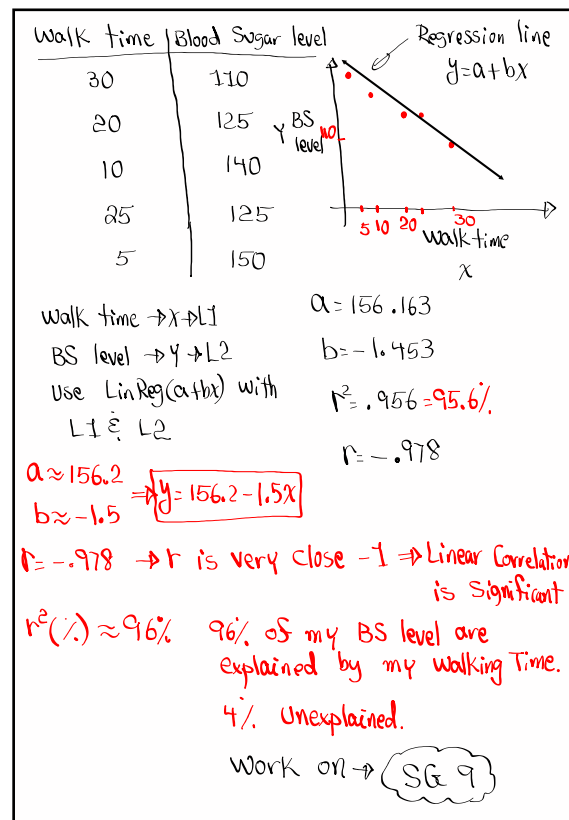
80% of QZ Scores were explained by

Study time.

X-values.

20% unexplained

Nov 3-7:56 AM



Nov 3-7:59 AM

Formulas for  $a$ ,  $b$ , and  $r$ :

$$a = \frac{\sum y \cdot \sum x^2 - \sum x \cdot \sum xy}{n \sum x^2 - (\sum x)^2}$$

$$b = \frac{n \sum xy - \sum x \cdot \sum y}{n \sum x^2 - (\sum x)^2}$$

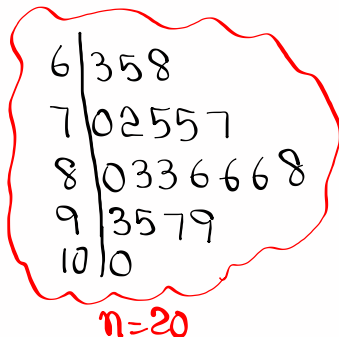
$$r = \frac{n \sum xy - \sum x \cdot \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \cdot \sqrt{n \sum y^2 - (\sum y)^2}}$$

Please watch the video on the right side of SG 9 and make notes.

Nov 3-8:11 AM

Class QZ 9

Use the STEM Plot below



Find

$$1) P_{15} = \frac{3\text{rd} + 4\text{th}}{2}$$

$$L = \frac{15}{100} \cdot 20 = 3$$

$$= \frac{68 + 70}{2} = \boxed{69}$$

$$2) P_{50} = \frac{10\text{th} + 11\text{th}}{2} = \frac{83 + 83}{2}$$

$$L = \frac{50}{100} \cdot 20 = 10$$

$$= \boxed{83}$$

3)  $K$  such that  $P_K = 80$

$$K = PR = \frac{R}{n} \cdot 100 = \frac{8}{20} \cdot 100 = \boxed{40}$$

$$\boxed{P_{40} = 80}$$

Nov 3-8:16 AM