

Statistics Lecture 4



Feb 19-8:47 AM

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 Enter
5:Setup Editor
- 5) To turn on the diagnostic key
2nd 0 ↓ ↓ ↓ ↓ ▶DiagnosticOn Enter Enter

Mar 21-8:06 AM

To store data elements in a list

[STAT] Edit

[1:Edit]

Store the following
Sample in L1

21 18 30 32 40
19 25 25 20 28

L1
21 **[Enter]**
18 **[Enter]**
:
28 **[Enter]**

Let's quit & clear screen

[2nd] [MODE] [clear]

To view **L1**

[2nd] [1] [Enter]

{ 21 18 30 32 - - - 28 }
→ → →
← ← ←

Mar 21-8:13 AM

To Sort a list

[STAT] Edit

[1:SortA(]

L1
[2nd] [1] [Enter]

Let's view L1, and make STEM plot

[2nd] [1] [Enter]

{ 18 19 20 21

→ → →

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

Let's quit & clear screen

[2nd] [MODE] [clear]

Mar 21-8:18 AM

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

[STAT] → [CALC]

[1:1-VAR STATS]

With Menu

List: L1

Freq List: [clear]

[Calculate]

[2nd] [1]

No Menu

L1

[Enter]

$\bar{x} = 25.8$

$S = S_x = 6.893$

How to find S^2 :

[VARS] [5:Statistics] [3:Sx]

[x²] [Enter]

47.51

To convert to reduced fraction

[MATH] [1:frac] [Enter]

$\frac{2138}{45}$

↓ $n = 10$

⬇ Min = 18

⬇ $Q_1 = 20$

⬇ Med. = 25

⬇ $Q_3 = 30$

⬇ Max = 40

5-Number
Summary

Min = 18

$Q_1 = 20$

Med. = 25

$Q_3 = 30$

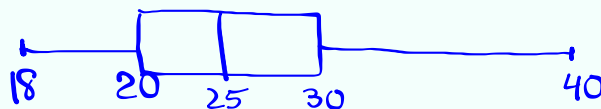
Max = 40

$$IQR = Q_3 - Q_1 = 30 - 20 = 10$$

$$\begin{aligned} \text{Upper Fence} &= Q_3 + 1.5(IQR) \\ &= 30 + 1.5(10) = 45 \end{aligned}$$

$$\begin{aligned} \text{Lower Fence} &= Q_1 - 1.5(IQR) \\ &= 20 - 1.5(10) = 5 \end{aligned}$$

No outliers



Mar 21-8:24 AM

Mar 21-8:37 AM

Let's clear all lists 2nd + 4: ClearAll Lists Enter

I randomly selected 20 exams, here are the Scores

73	88	100	55	65	Store in L1, then Sort it, then make STEM Plot
90	70	95	80	54	
100	68	72	85	85	
80	93	78	59	69	

STAT Edit L1 1: Edit

STAT Edit L1 2: SortA Enter

Now view L1, and make STEM Plot

2nd 1 Enter

{54 55 59 65 ... 100}
→ → →

5	459
6	589
7	0238
8	00558
9	035
10	00

what is the 8th element in L1.

2nd 1 [8 Enter 72

Mar 21-8:40 AM

find $\bar{x}$ & S

STAT → CALC 1: 1-VAR STATS

use L1

Estimate S

$S \approx \frac{\text{Range}}{4} = \frac{100-54}{4} = \frac{46}{4} = 11.5$

find S^2 in reduced fraction.

VARS 5: Statistics 3: Sx

x^2 MATH 1: Frac Enter

$$\begin{array}{r} 75459 \\ \hline 380 \end{array}$$

$\bar{x} = 77.95$
 $S = S_x = 14.092$
 $n = 20$
 Min = 54
 $Q_1 = 68.5$
 Med = 79
 $Q_3 = 89$
 Max = 100

Mar 21-8:51 AM

Complete the chart below

of classes 4
class width 9

class limits	class BNDrs	class MP	class F	Com. F	Rel. F	% F
18 - 26	17.5 - 26.5	22	4	4	.125	12.5%
27 - 35	26.5 - 35.5	31	9	13	.281	28.1%
36 - 44	35.5 - 44.5	40	12	25	.375	37.5%
45 - 53	44.5 - 53.5	49	7	32	.219	21.9%

$n = 32$ $Rel. F = \frac{S}{n} = \frac{S}{32}$

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

Clear All Lists $[2nd] [1] [4:clearAll lists] [Enter]$

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

L1	L2
22	4
31	9
40	12
49	7

$[\rightarrow]$

Mar 21-8:59 AM

$[STAT] [\rightarrow] CALC$

$[1:1-VAR STATS]$

With Menu
List: L1
FreqList: L2
 $[Calculate]$

NO Menu
L1, L2
 $[7] [Enter]$

$\bar{x} = 37.1875$
 $S = S_x = 8.686$
 $n = 32$

S^2 in reduced fraction

$[VARS] [5:Statistics] [3:Sx]$
 $[x^2] [MATH] [1:Frac] [Enter]$

$S^2 = \frac{18711}{248}$

Mar 21-9:13 AM

(SG 9)

working with ordered Pairs
(x,y)

x	y
2	5
3	8
4	10
4	12
5	12

n=5

Scatter Plot

Regression line

$y = a + bx$

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

x → L1
y → L2

	Menu	No Menu
$\sum x = 18$	xlist: L1	L1, L2
$\sum x^2 = 70$	ylist: L2	[☒]
$n = 5$	Freq list: [clear]	[Enter]
$\sum y = 47$	[Calculate]	
$\sum y^2 = 477$		
$\sum xy = 182$		

Mar 21-9:32 AM

How to find equation of the regression line

$y = a + bx$

[STAT] → CALC with Menu No Menu

8:LinReg(a+bx)

xlist: L1 L1, L2

ylist: L2 [☒]

[Enter]

$a = .538 \approx .5$

$b = 2.462 \approx 2.5$

$r^2 = .895$

$r = .946$

If r & r^2 missing,

You must turn on the diagnostic key.

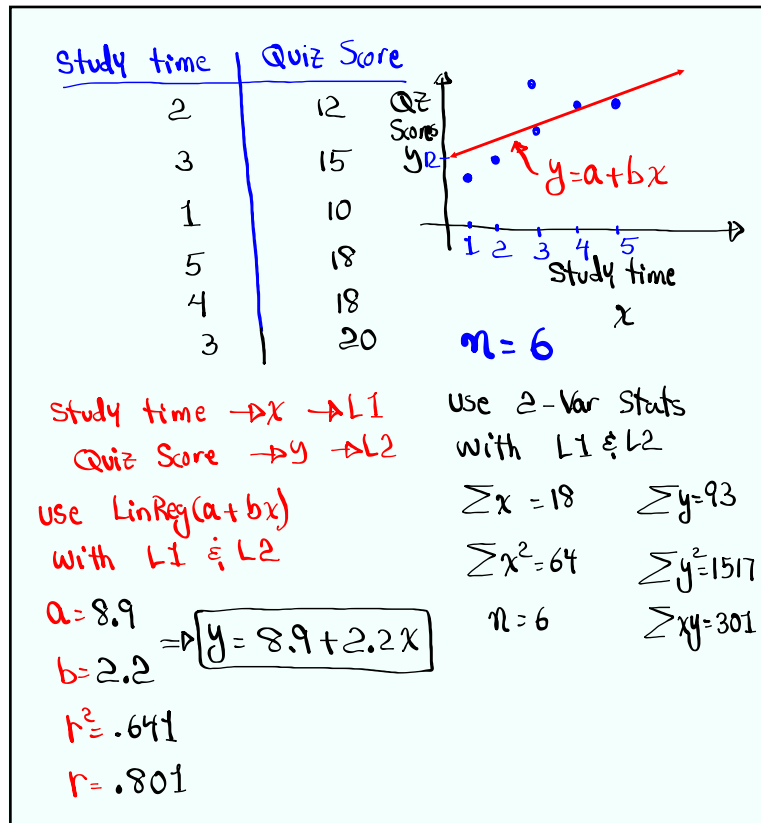
[clear]

[Calculate]

$y \approx .5 + 2.5x$

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

Mar 21-9:41 AM



Mar 21-9:50 AM

r Linear Correlation Coefficient

$$-1 \leq r \leq 1$$

when r is close to ± 1 ,
 Linear Correlation is Significant

when r is close to 0,
 Linear Correlation is not Significant.

From last example $\rightarrow r = .801$ is close to 1
 Linear Correlation
 Seems to be
 Significant

Mar 21-10:00 AM

r^2 is the Coefficient of determination

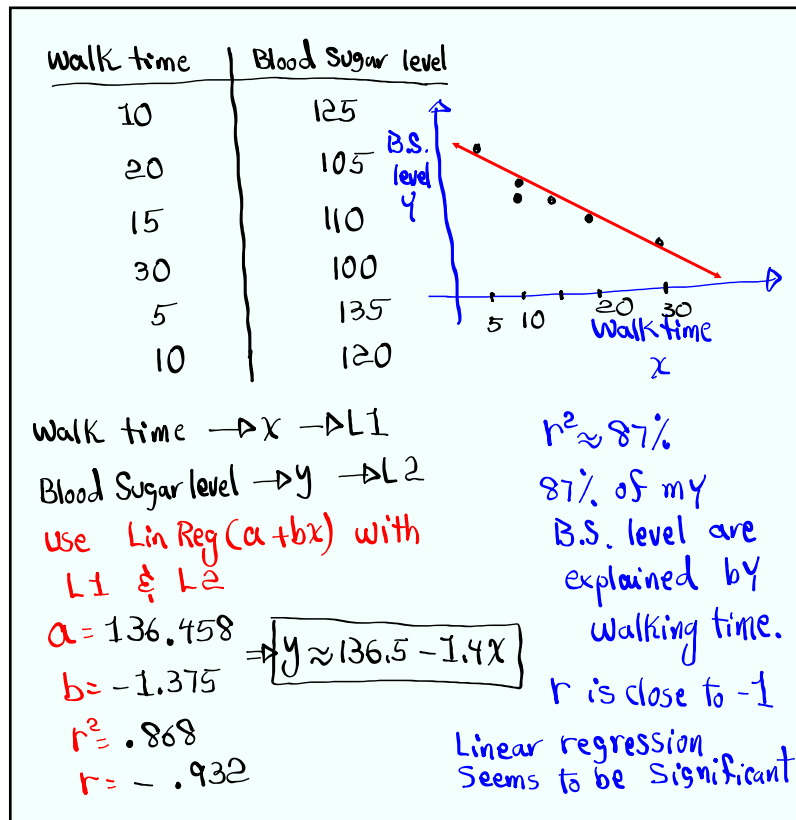
Always express as a whole %.

r^2 tells us what % of y-values are explained by x-values.

From last example $\rightarrow r^2 \approx .641 \approx 64\%$

64% of Quiz Scores are explained by Study time.

Mar 21-10:04 AM



Mar 21-10:07 AM

How to make predictions:

If r is significant,

$\Rightarrow$ use the regression line

If r is not significant

$\Rightarrow$ use $\bar{y}$ $\bar{y} = \frac{\sum y}{n}$

VARS **5: Statistics** **5: $\bar{y}$**

Enter

From last example $\bar{y} = 115.8\bar{3} \approx 116$

Predict my Blood Sugar level if I walk for **15 minutes** assuming **r is significant.**

$$y \approx 136.5 - 1.4(15) \approx 115.5 \approx \boxed{116}$$

Mar 21-10:17 AM

$$\sum x = 18 \quad \sum y = 47$$

$$\sum x^2 = 70 \quad \sum y^2 = 477$$

$$n = 5 \quad \sum xy = 182$$

Regression line $y = a + bx$

$$a = \frac{\sum y \sum x^2 - \sum x \sum xy}{n \sum x^2 - (\sum x)^2} = \frac{47 \cdot 70 - 18 \cdot 182}{5 \cdot 70 - 18^2} = \frac{14}{26} \approx \boxed{.538}$$

$$b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2} = \frac{5 \cdot 182 - 18 \cdot 47}{5 \cdot 70 - 18^2} = \frac{64}{26} \approx \boxed{2.462}$$

Mar 21-10:36 AM

$\sum x = 18$ $\sum y = 47$
 $\sum x^2 = 70$ $\sum y^2 = 477$
 $n = 5$ $\sum xy = 182$

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}} = \frac{5 \cdot 182 - 18 \cdot 47}{\sqrt{5 \cdot 70 - 18^2} \sqrt{5 \cdot 477 - 47^2}}$$

$\sqrt{64} = \frac{64}{\sqrt{26} \sqrt{176}} = \frac{64}{\sqrt{4576}}$

$64 \div [\text{2nd}] [\text{x}^2] 4576 [\text{Enter}]$
 $r = .946$

$r^2 = (.946)^2 \approx .895$ $r^2(\%) \approx 90\%$

Mar 21-10:42 AM

x	y
2	5
3	8
4	10
4	12
5	12

$x \rightarrow L1$
 $y \rightarrow L2$
 use LinReg(a+bx) with L1 & L2

$a \approx .538$
 $b \approx 2.462$
 $r^2 \approx .895$
 $r \approx .946$

Mar 21-10:49 AM

Class Quiz 2

using Calc.

Consider the Sample below

12 15 18 10

16 15 10 8

20 16 14 15

Find

1) $\bar{x} \approx 14$

2) $s \approx 4$

3) $s^2 = \frac{1619}{132}$

} Round to
whole #} Reduced
fraction

Mar 21-10:57 AM