Elementary Statistics Lecture 5

Class Qz 1:

Consider the Sample below

| 8 | 12 | 10 | 10 | 7 |
| 15 | 13 | 20 | 18 | 12 |

find

1) $\bar{x}$

→ L1

1-var stats with L1

$\bar{x} = 12.5$

$S = 4.170$

$S^2 = \dfrac{313}{18}$

2) S in 3-decimals.

3) S^2 in reduced fraction

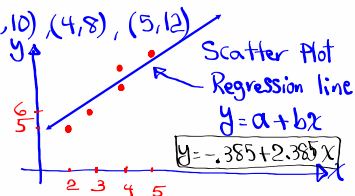VARS 5: Statistics

3: S_x x^2 MATH   1: ►Frac

Enter

Working with ordered-Pairs   [SG 9]

Plot the following ordered-Pairs

(2,5) , (3,6) , (4,10) , (4,8) , (5,12)

x	y
2	5
3	6
4	10
4	8
5	12

Scatter Plot
Regression line
$y = a + bx$

$y = -.385 + 2.385x$

clear all lists
Reset all lists
$x \to L1$, $y \to L2$

[STAT] $\to$ [CALC]
   [8: LinReg(a+bx)]

L1	L2
2	5
3	6
4	10
4	8
5	12

With Menu: No Menu
  xlist: L1   LinReg(a+bx)
  Ylist: L2   L1, L2 [enter]
         [clear]   [7]
  [Calculate]

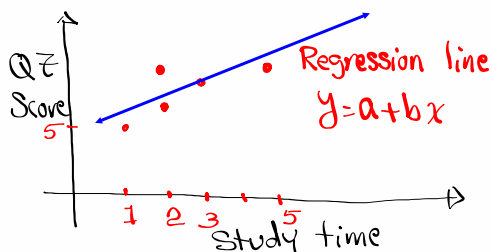$a = -.385$

$b = 2.385$

$r^2 = .902$

$r = .949$

If r^2 & r are missing:
[2nd] [0] ↓↓↓ ···↓ [▲ Diagnostic ON] [Enter] [Enter]

I surveyed 5 students, chart below
shows   study time and QZ Score.

Study time	QZ Score
1	5
2	7
2	10
3	9
5	10

QZ
Score   Regression line
5        $y = a + bx$

Study time

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

[STAT] $\to$ CALC
      [8: LinReg(a+bx)]

$a = 5.543$

$b = 1.022$

$r^2 = .511$

$r = .715$

$a \approx 6$
$b \approx 1$ $\to$ $y \approx 6 + x$

with some assumptions

If you study 1 hr $\to y \approx 6 + 1 = 7$
If you study 4 hrs $\to y \approx 6 + 4 = 10$

What is r?

r is linear Correlation Coefficient

$-1 \le r \le 1$

If r is close to ± 1,

Linear Correlation is Significant.

If r is close to 0,

Linear Correlation is not Significant.

QZ Score	Exam Score
8	85
9	90
6	70
10	95
5	65

$a \approx 34$, $b \approx 6$

$\boxed{y = 34 + 6x}$

QZ Score $\to x \to L1$

Exam Score $\to y \to L2$

Use LinReg(a+bx)
with L1 & L2 to
find

$a = 33.721$ $r^2 = .993$

$b = 6.221$ $r = .997$

r is very close to 1

Linear Correlation is
Significant.

What about r^2?

r^2 is coefficient of determination.

Always express r^2 in whole %

r^2 in % tells us what percent of Y-values are explained by x-values.

Last example

$r^2 = .993 \Rightarrow r^2 \approx 99\%$

99% of exam scores are explained by QZ scores.

1% is unexplained.

How to make predictions:

If r is significant $\Rightarrow$ Use the regression line to make predictions.

If r is not significant $\Rightarrow$ Use $\bar{y}$

$\bar{y} = \dfrac{\sum y}{n}$ OR   VARS 5: Statistics 5: $\bar{y}$ Enter

from last example $\boxed{\bar{y} = 81}$

How to determine if r is significant or not: **Wait**