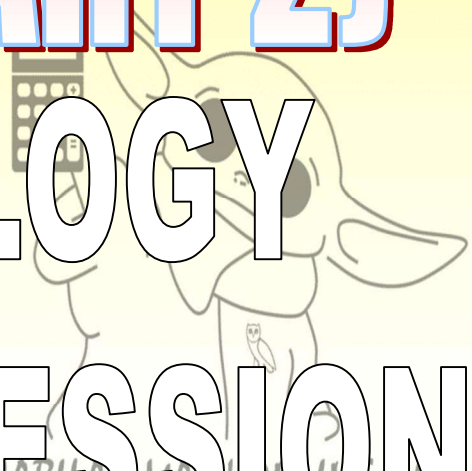
ST. JEAN DE BREBEUF MATHEMATICS

CHAPTER 3.4 (PART 2)

USING TECHNOLOGY FOR LINEAR REGRESSION



CHAPTER 3.4 (PART 2) USING TECHNOLOGY FOR LINEAR REGRESSION

EXAMPLE

Last year, twelve randomly selected students took a mathematics aptitude test before they began their college mathematics course. Their results on the aptitude test and their final mark in the course are shown in the table. All scores are out of 100.

Use the graphing calculator and the instructions below to create a **scatterplot**.

STUDENT	APTITUDE TEST SCORE	FINAL MATH MARK
A	95	86
B	73	68
C	59	61
D	68	70
E	84	90
F	80	87
G	82	71
H	64	60
I	66	72
J	50	45
K	74	74
L	64	53

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EXAMPLE

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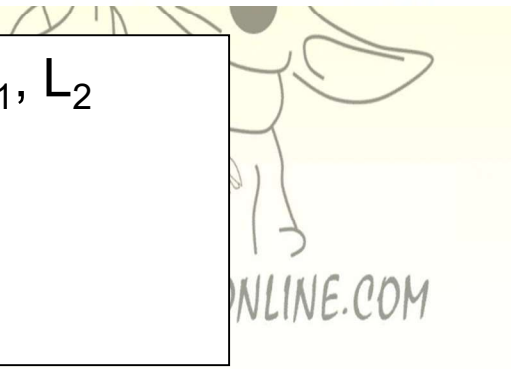
CREATING A SCATTER PLOT

1. You need to set-up your calculator so it can perform linear regression.
Press **2^{nd}**
0 (zero)
x^{-1}
Use the **DOWN** cursor key until you reach **Diagnostic On**. Once you reach this command, press **ENTER** and **ENTER**

2. Clear the data table by pressing **STAT**
4:ClrList
2^{nd} and **1** then **","**
2^{nd} and **2** (* your screen should look like the one on the right)
ENTER

ClrList L_1, L_2



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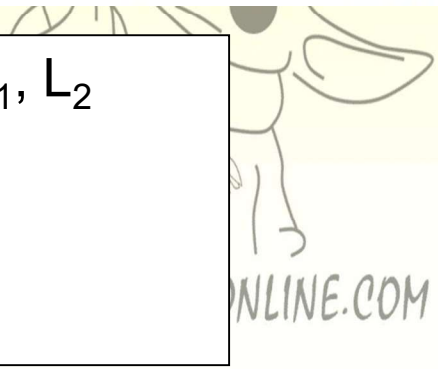
CREATING A SCATTER PLOT

3. Enter the data into the lists by pressing **STAT** and **1:Edit**. Enter the "**Aptitude Test Score**" data in $\mathbf{L_1}$ and "**Final Math Mark**" data in $\mathbf{L_2}$.

4. Create a scatter plot by pressing **2nd, Y=, 1** and **ENTER**. Make sure that the cursor is on **"On"** when you press *Enter*. By default, your **Xlist** should be $\mathbf{L_1}$ and **Ylist** should be $\mathbf{L_2}$.

5. To display your graph, press **ZOOM** and **9**.

ClrList L_1, L_2



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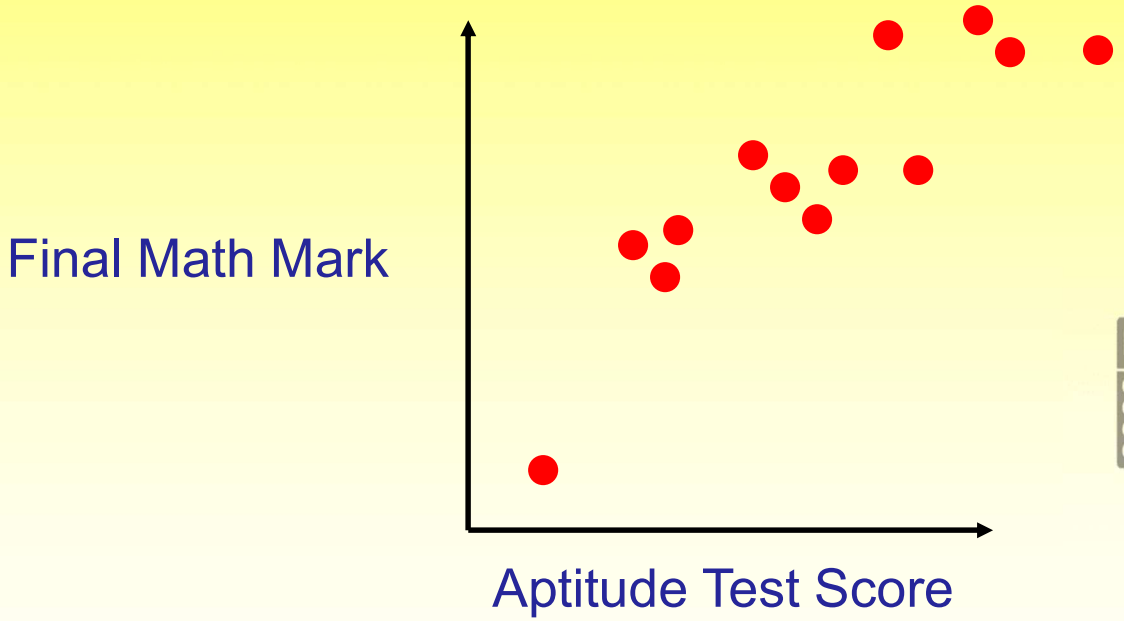
EXAMPLE

CREATING A SCATTER PLOT

6. Sketch the *scatterplot* below. Label all axes



CHAPTER 3.4 (PART 2) USING TECHNOLOGY FOR LINEAR REGRESSION

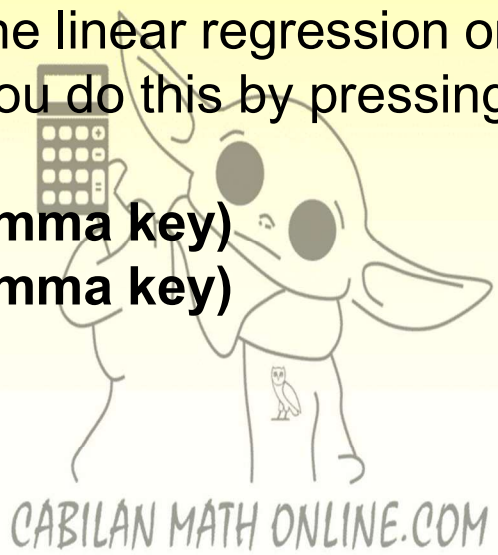
EXAMPLE

REGRESSION ANALYSIS and LINE OF BEST FIT

1. To perform *regression analysis*, press
   STAT
   Move the *right* cursor over to **CALC**
   Press **4:LinReg(ax+b)** (this activates the linear regression function)

2. You must tell the calculator which data to perform the linear regression on. We do this by entering the lists from our data table. You do this by pressing

   2^{nd}, 1 (this will tell it to pick L_1) then **“,” (comma key)**
   2^{nd}, 2 (this will tell it to pick L_2) then **“,” (comma key)**



CHAPTER 3.4 (PART 2) USING TECHNOLOGY FOR LINEAR REGRESSION

EXAMPLE

REGRESSION ANALYSIS and LINE OF BEST FIT

3. We will store the information for our line of best fit in a variable called $\mathbf{Y_1}$. To do this, press:

VARS
Right cursor key to **Y-VARS**
1:Function
1:Y_1

Your screen should look like this:

LinReg(ax+b) L_1, L_2,Y_1

4. Press **ENTER** to execute. Fill the information that is given to you:

LinReg

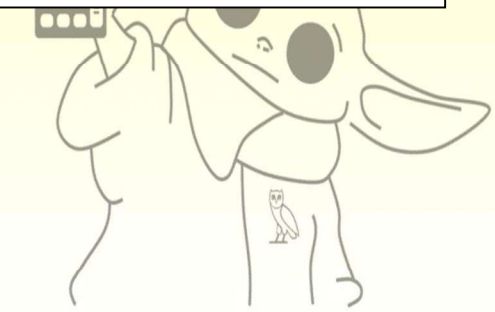
y = ax+b

a = 0.974

b = 0.014

r^2 = 0.769

r = 0.877



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CHAPTER 3.4 (PART 2) USING TECHNOLOGY FOR LINEAR REGRESSION

EXAMPLE

(a) Write the equation of the line of best fit **y = 0.974x + 0.014**

(b) What is the value of the **correlation coefficient**? **r = 0.877**

(c) What does the correlation coefficient tell you about

The **strength** of the correlation?

STRONG

(Strong, Weak, No correlation)

The **slope (direction)** of the line?

POSITIVE

(Positive, Negative, Horizontal)

4. Press **ENTER** to execute. Fill the information that is given to you:

LinReg

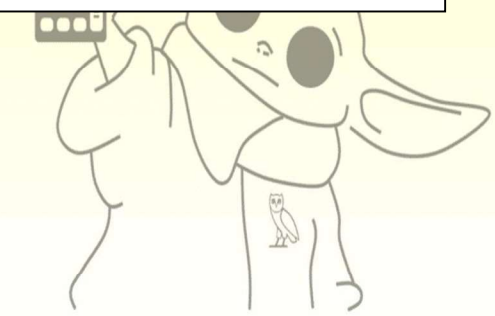
y = ax+b

a = 0.974

b = 0.014

r^2 = 0.769

r = 0.877



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EXAMPLE

Aptitude test score

(a) Write the equation of the line of best fit **y = 0.974x + 0.014**

Final math mark

(d) Using the equation from **4(a)**, answer the following:

(i) If Hannah scored **75** on the *aptitude test*, what would you predict to be her mark in the college math course?

*Substitute **x = 75** into the equation*

y = 0.974x + 0.014

y = 0.974(75) + 0.014

y = 73.05 + 0.014

y = 73.064

*Hannah would probably score **73.064%** in the math course*

(ii) If Pietro finished off his *college math course* with a **39**, what would you expect his aptitude test score to be?

*Substitute **y = 39** into equation*

y = 0.974x + 0.014

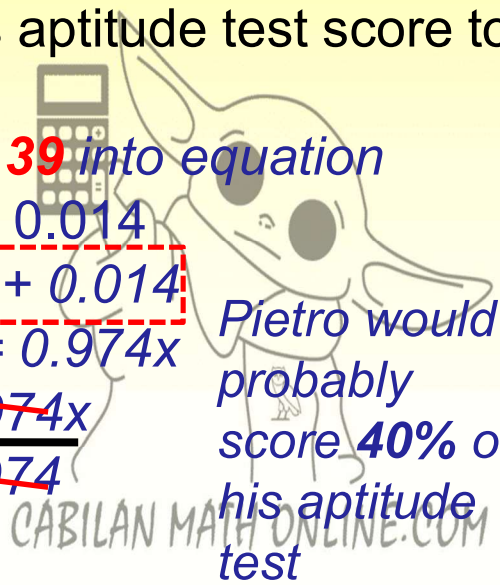
39 = 0.974x + 0.014

39 – 0.014 = 0.974x

$\frac{38.986}{0.974} = \frac{0.974x}{0.974}$

***40.0** = x*

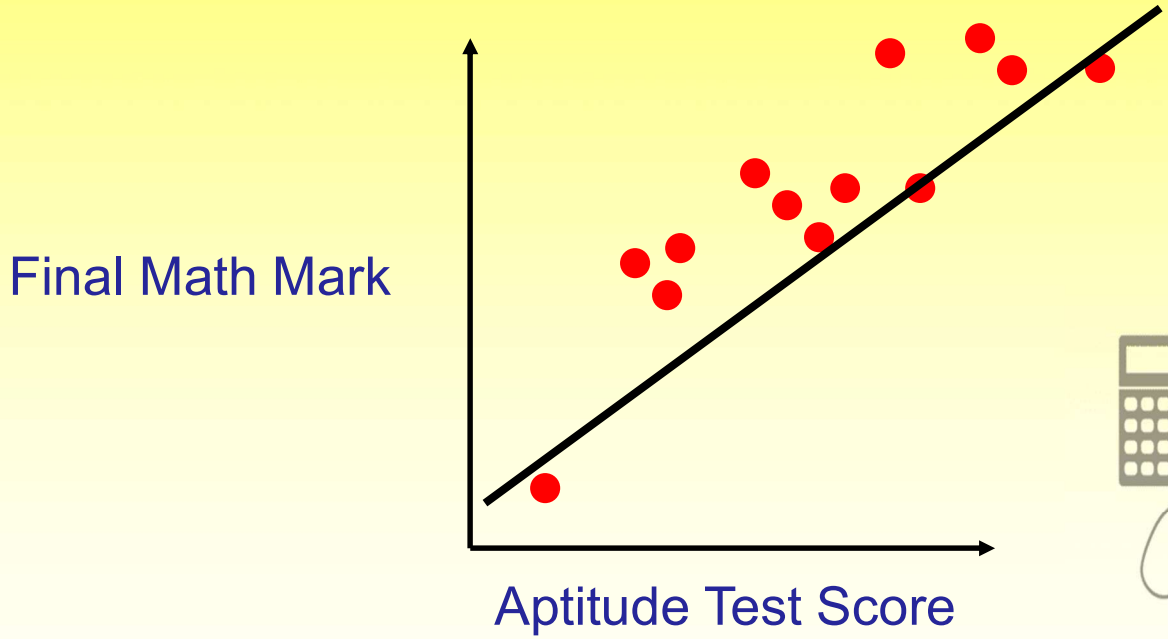
*Pietro would probably score **40%** on his aptitude test*



CHAPTER 3.4 (PART 2) USING TECHNOLOGY FOR LINEAR REGRESSION

EXAMPLE

(5) To display the *line of best fit*, Press **GRAPH**. Draw the line of best fit on the sketch you drew in **Question #6**



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HOMEWORK / SEATWORK

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