Scatter Plots and Equations to fit the data

Correlation: relationship between two quantities

Positive Correlation

As x increases, y increases

Pos Slope

Negative Correlation

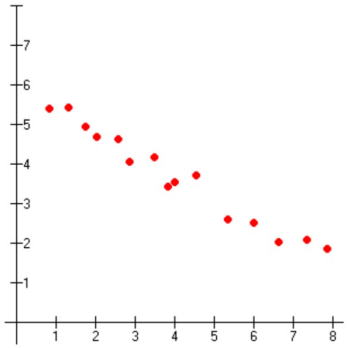
As x increases, y decreases

Neg Slope

No Correlation

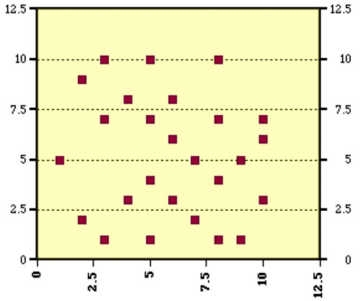
No relationship between quantities

What type of correlation does each graph show?



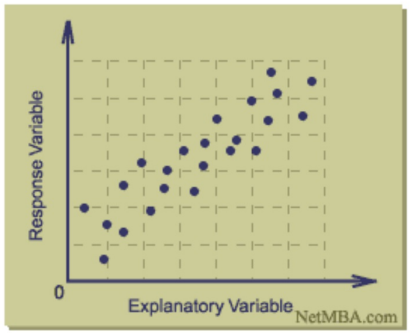
Negative Correlation, pretty Strong

What type of correlation does this graph show?



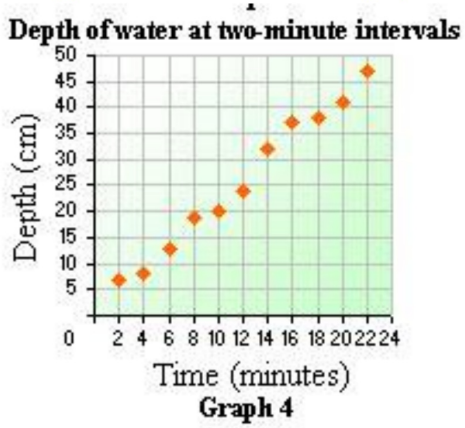
No Correlation

What type of correlation does this graph show?



Positive Correlation
rather Weak

What type of correlation does this graph show?



Positive Correlation
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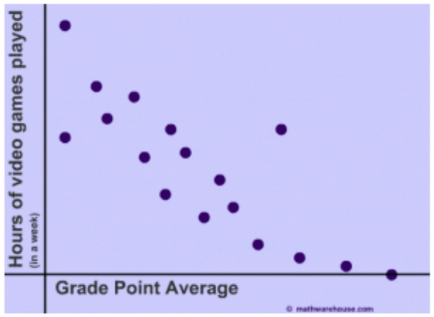
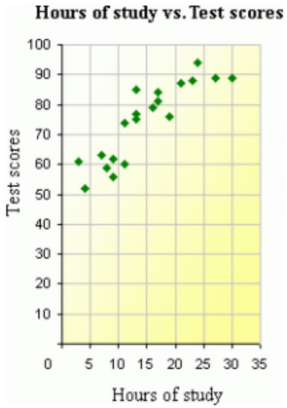


Negative Correlation

rather Weak

Is this a Strong or Weak Positive Correlation?

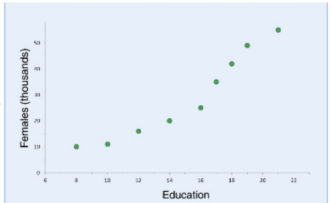


"Strong" and "Weak" are sometimes hard to define.

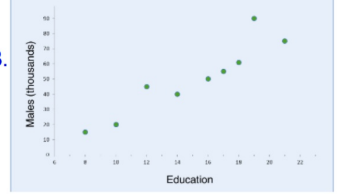
Sometimes you only use these terms when comparing two scatter plots

Which correlation is stronger?

A.



B.



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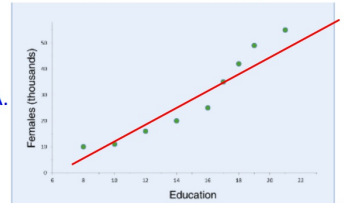

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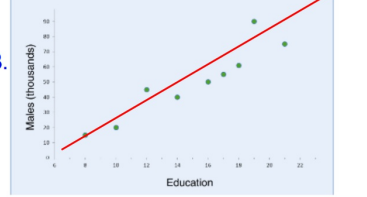


These are both pretty strong positive correlations but given the trend lines drawn it appears Graph A is a little stronger.

Strong Correlation vs Weak Correlation

The closer the data points are to forming a line the stonger the Correlation

Scatter plots on the graphing calculator.

x (year)	2005	2006	2007	2008	2009
y (sales)	12	19	29	37	45

Enter the data:

STAT 1:Edit

Enter y(sales) in L_2

Enter x(year) in L_1

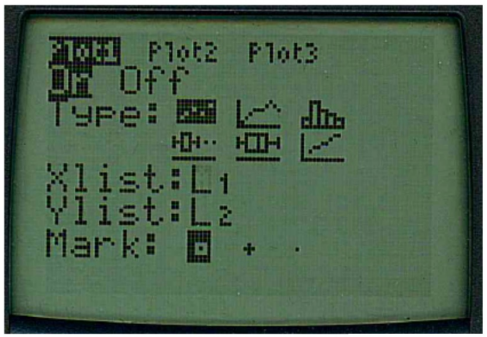
To make a scatter plot on the graphing calculator:

1. Press 2nd then Y=

2. Turn on a Scatter Plot

3. Make sure your screen looks like this →

4. Press Zoom then choose Option 9:



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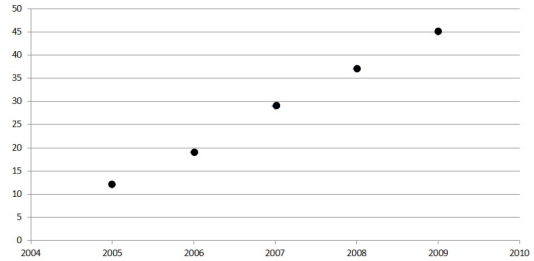

What kind of correlation do you see? Strong Pos

What kind of equation do you think would fit this data? Linear

What if you don't have a graphing calculator to make a scatter plot?

- Use a sheet of graph paper
- Use spreadsheet software such as Excel
- Use the internet

r Correlation Coefficient

r > 0 positive correlation
r = 1 Perfect positive correlation

r < 0 negative correlation
r = -1 Perfect negative correlation

The closer r is to ±1 the better the fit.

The closer |r| is to 1 the better the fit.

Linear Regression:
finding the equation of the "line of best fit".

x (year)	2005	2006	2007	2008	2009
y (sales)	12	19	29	37	45

Doing a Linear Regression on the graphing calculator.

STAT → CALC 4: LinReg (ax+b)

Regression Equation: 8.4x - 16830.4

Correlation Coef: 0.9988681377

Is this line a good fit? It seems like a good fit since the correlation coefficient is very close to 1.

Using the regression equation

x (year)	2005	2006	2007	2008	2009
y (sales)	12	19	29	37	45

Regression Equation: 8.4x - 16830.4

Find the sales in 2016 according to this equation.

Replace x with 2016: 8.4(2016) - 16830.4 = 104

The equation predicts a sales of 104 in the year 2016

In what year will the sales reach 100?

Replace y with 100 and solve for x: 8.4x - 16830.4 = 100 → x = 2015.5

The equation predicts a sales of 100 in the year 2015.5 which means sometime in the middle of the year.

Make a scatter plot of this data.

Speed (x)	30	40	50	60	70
Stopping distance (y)	25	55	105	188	300

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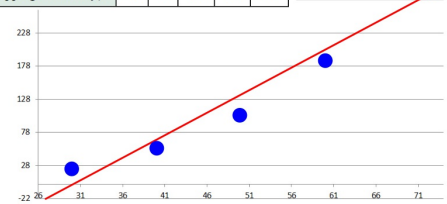


Find the linear regression equation:

y=6.83x - 206.9

Find the correlation coefficient: 0.9714296194

Graph the line on the scatter plot.

Is this line a good fit? It doesn't appear to be a bad fit but not the a great fit either.

Does this data appear to be linear? This data appears to be more of a curve rather than a line.

Quadratic Regression:

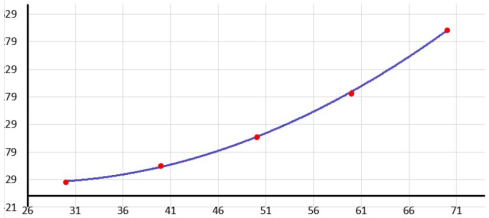
Finding the equation of a quadratic function that is the best fit for the data.

Performing a quadratic regression using the graphing calculator.

STAT → CALC 4: QuadReg

Regression Equation: $y = 0.141x^2 - 7.241x + 116.743$

Speed (x)	30	40	50	60	70
Stopping distance (y)	25	55	105	188	300



Find the Quadratic regression equation:

$y = 0.14x^2 - 7.24x + 116.74$

Graph this equation on the sactter plot.

Which appears to be the better fit for the data, a line or a parabola?

the parabola is a better fit because it touches all five data points.

What if you don't have a graphing calculator to do find a regression equation?

- Use the internet ---- My Blog
- Spreadsheet software like Excel