HOW Reminders

- **Preparedness:**
  - Be in the classroom when the bell rings
  - Have something to write with, a calculator, and your notebook

Engagement:

- Have your phone and computer put away

Warm-Up

Find the vertex for each quadratic function.

1) $-5(x+2)^2+7$

$(-2, 7)$

2) $-2x^2+4x+8$

$(1, 10)$

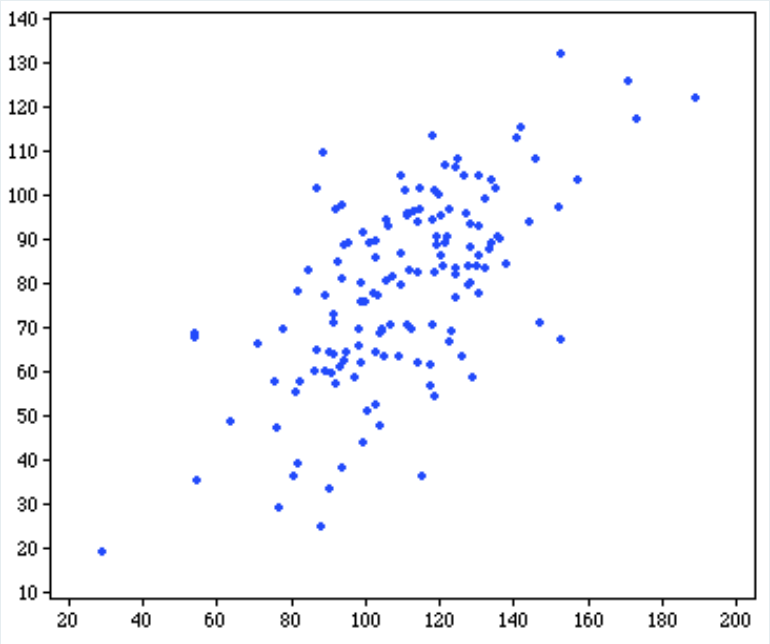
3) $-2(x-6)(x+4)$

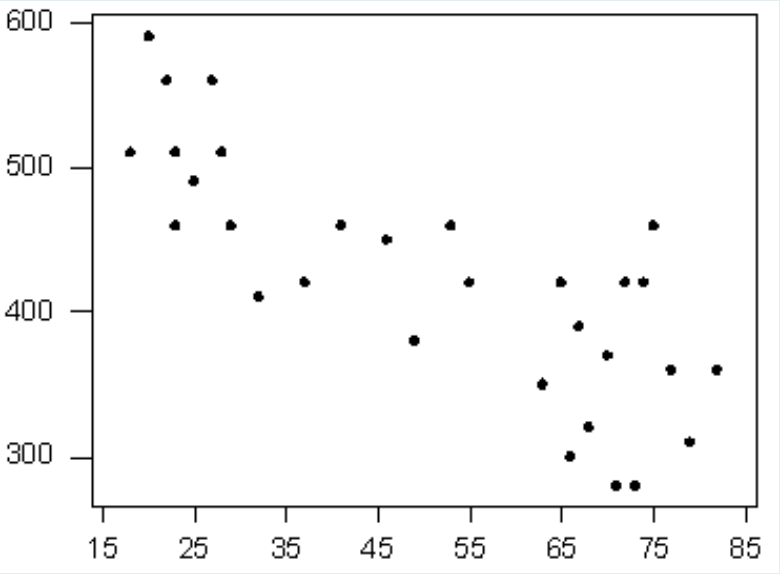
$(1, 50)$

1.3 & 2.4 Notes - Correlation

Scatterplot

A scatterplot is a graph made up of points that are not connected to each other.





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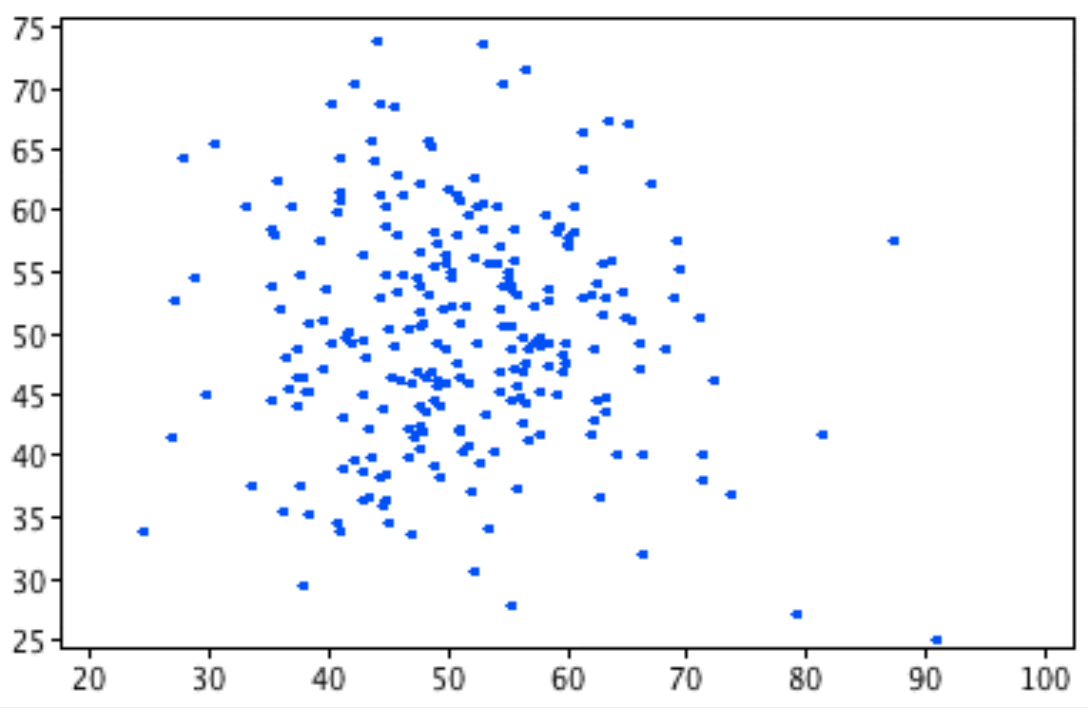
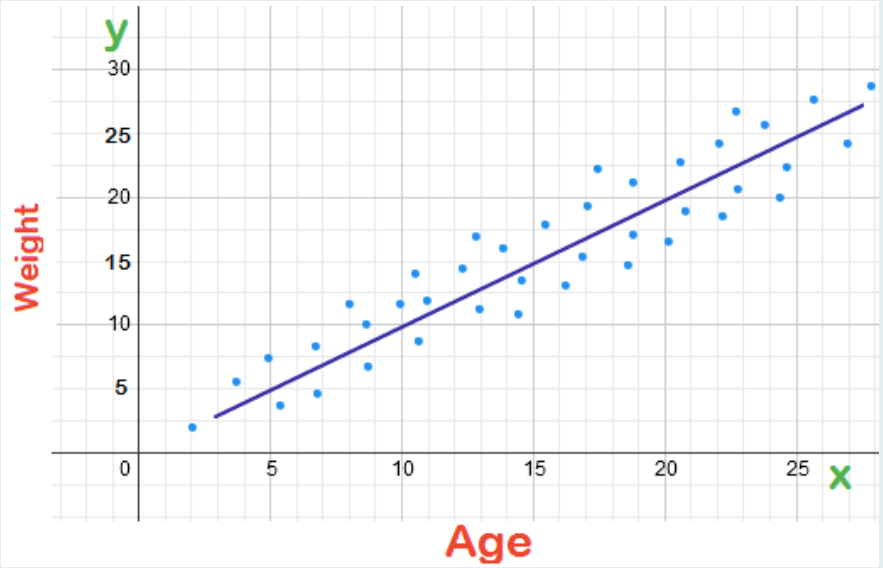
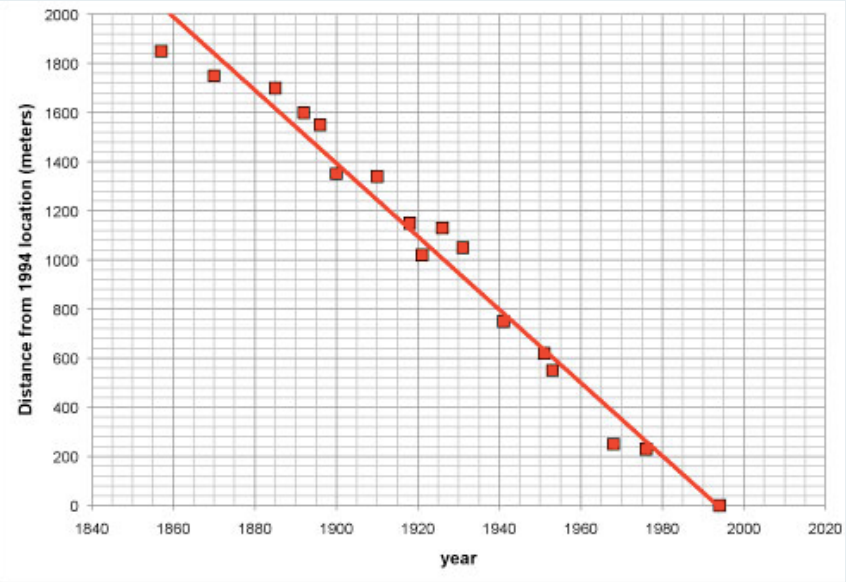


Line of Best Fit

A *line of best fit* is a line that shows the overall path of all of the points in a scatterplot.

A line of best fit DOES NOT connect all of the points together.





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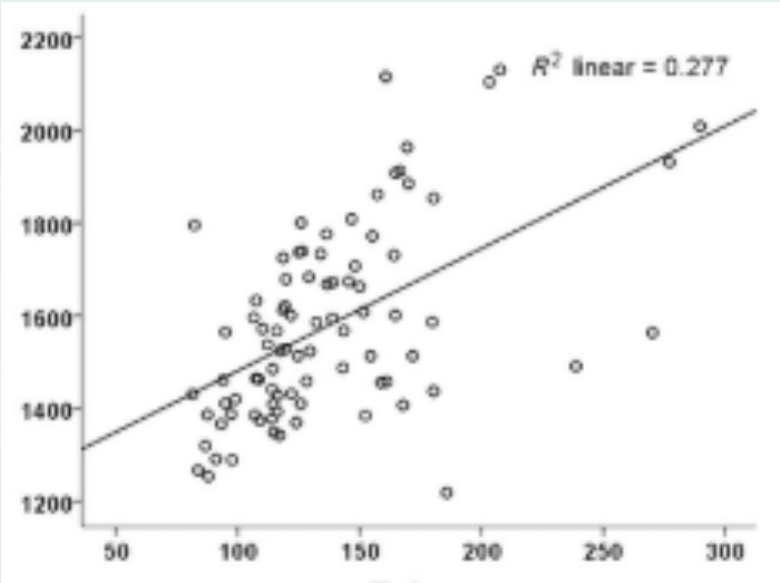
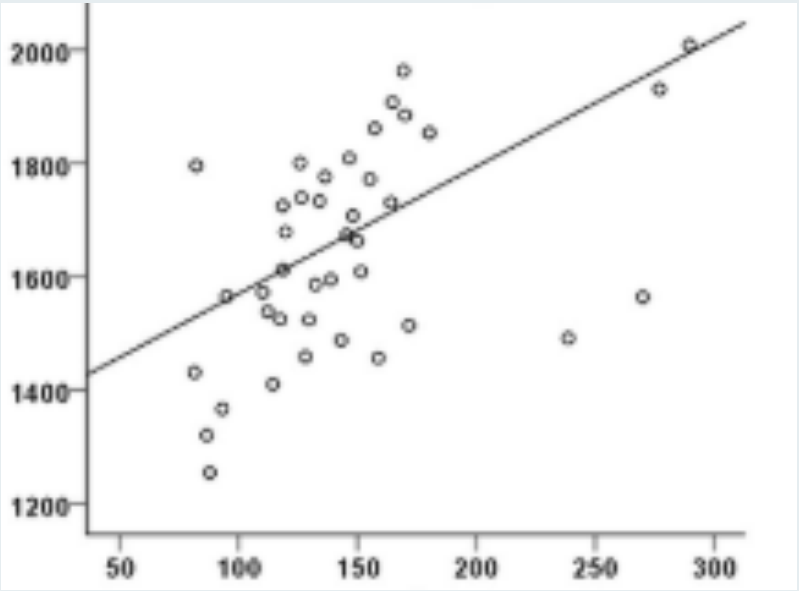
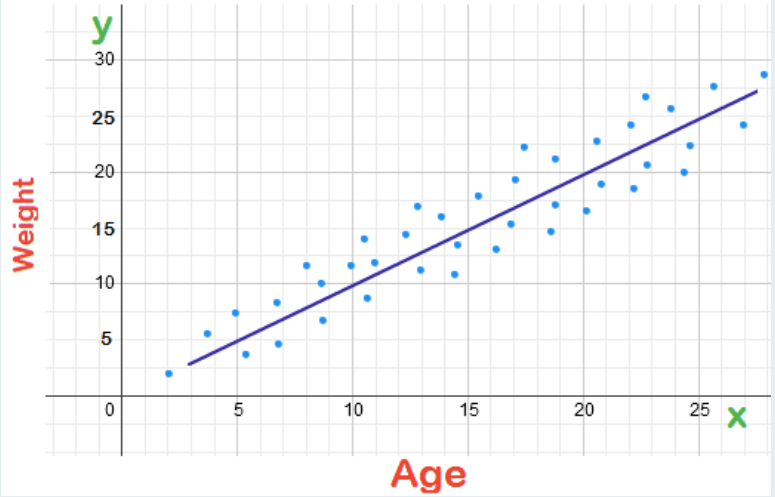


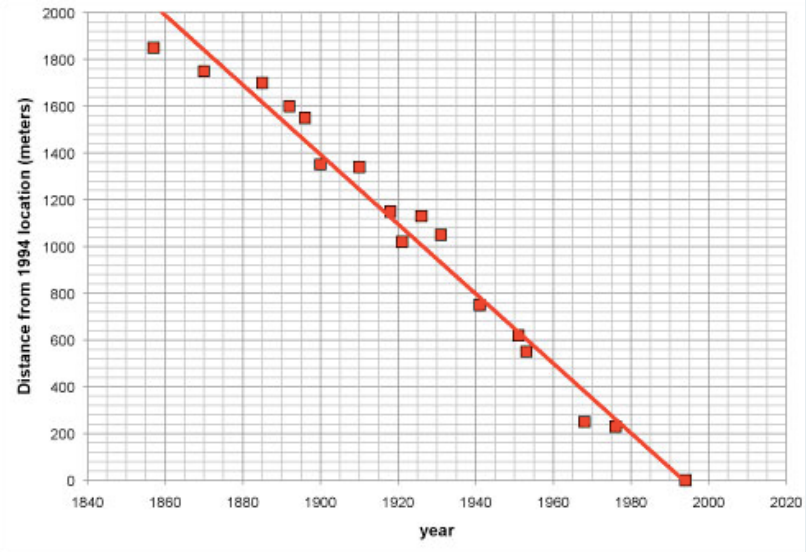


Correlation

The *correlation* of a line of best fit is a number that tells you about the relationship of the points in your scatterplot.

A *strong correlation* tells you that the points in your scatterplot make a clear linear path.

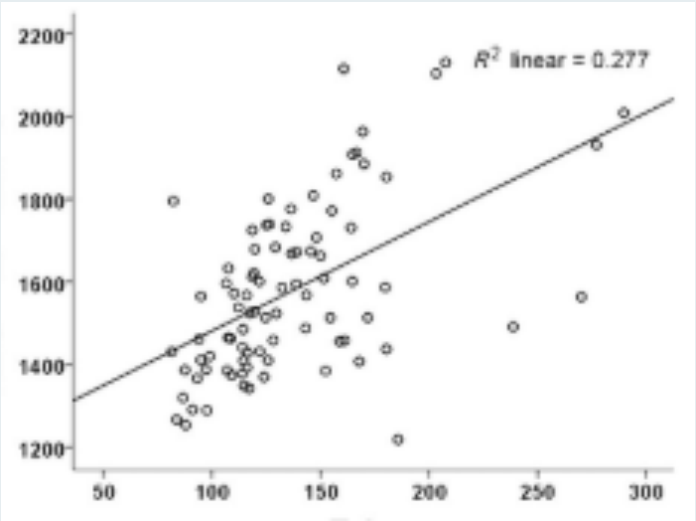


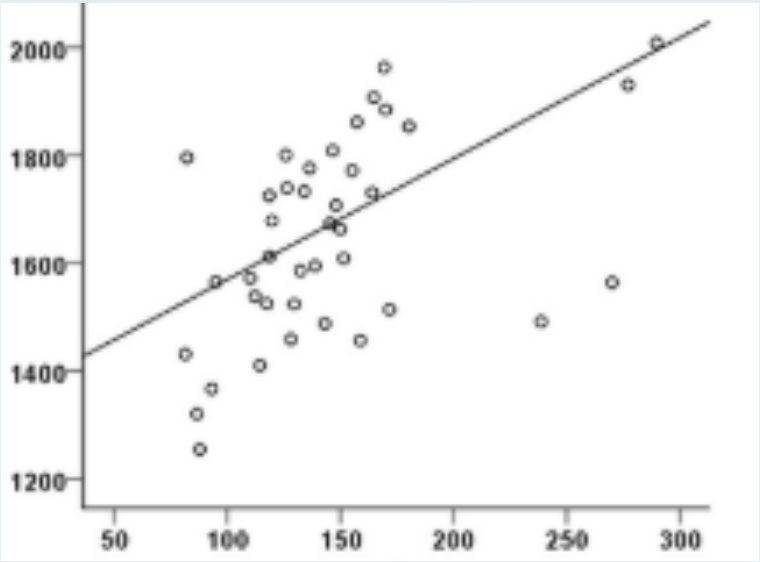


Correlation

The *correlation* of a line of best fit is a number that tells you about the relationship of the points in your scatterplot.

A *weak correlation* tells you that the points in your scatterplot do NOT make a clear linear path.

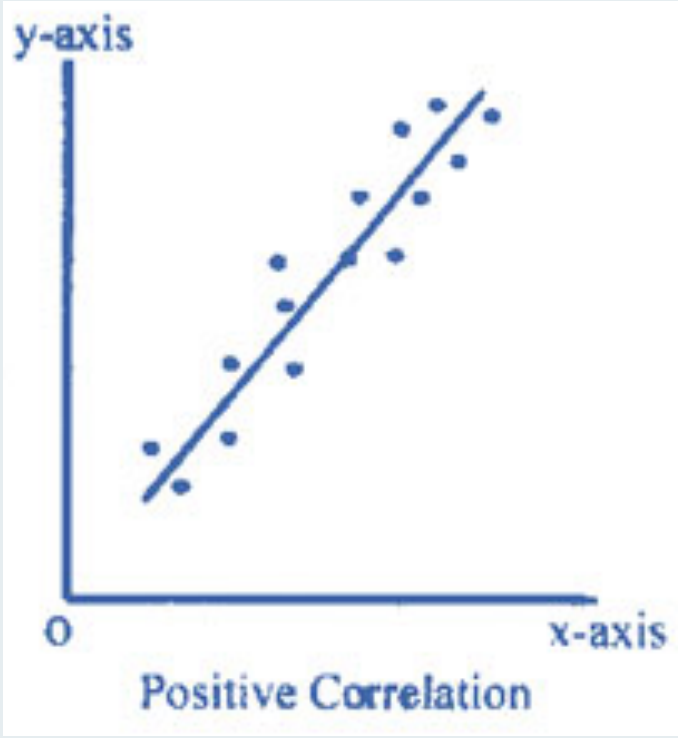




Correlation

There are 3 main types of correlation:

Positive correlation: The points (and line of best fit) generally have a positive slope.



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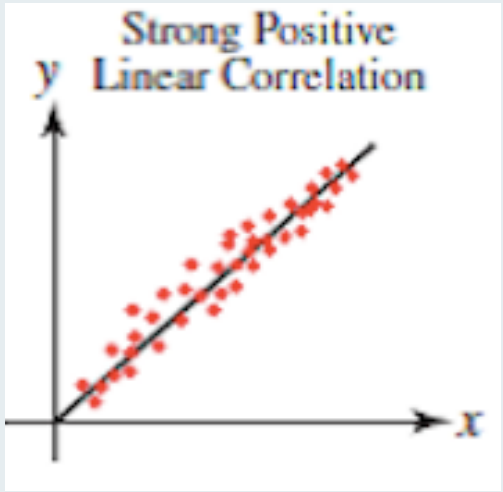
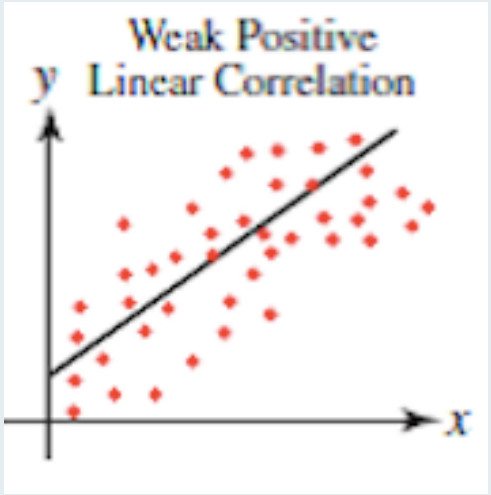
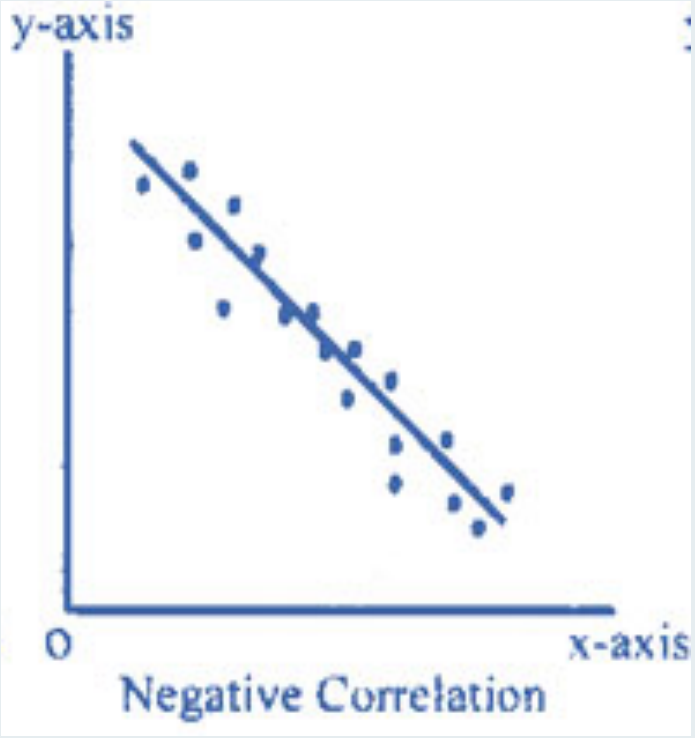




Correlation

There are 3 main types of correlation:

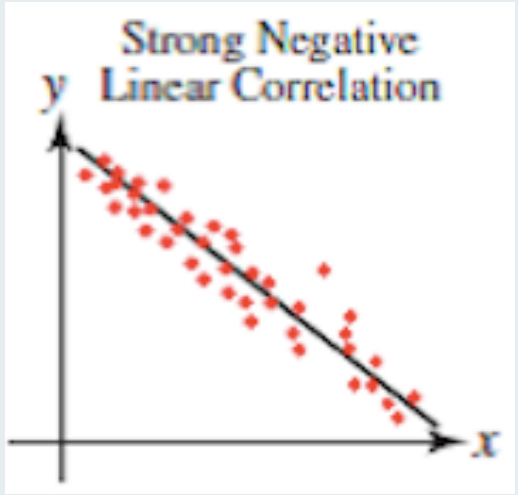
Negative correlation: The points (and line of best fit) generally have a negative slope.

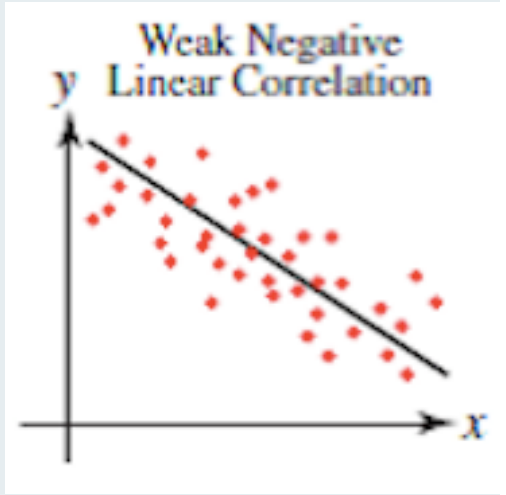


Correlation

There are 3 main types of correlation:

Negative correlation: The points (and line of best fit) generally have a negative slope.

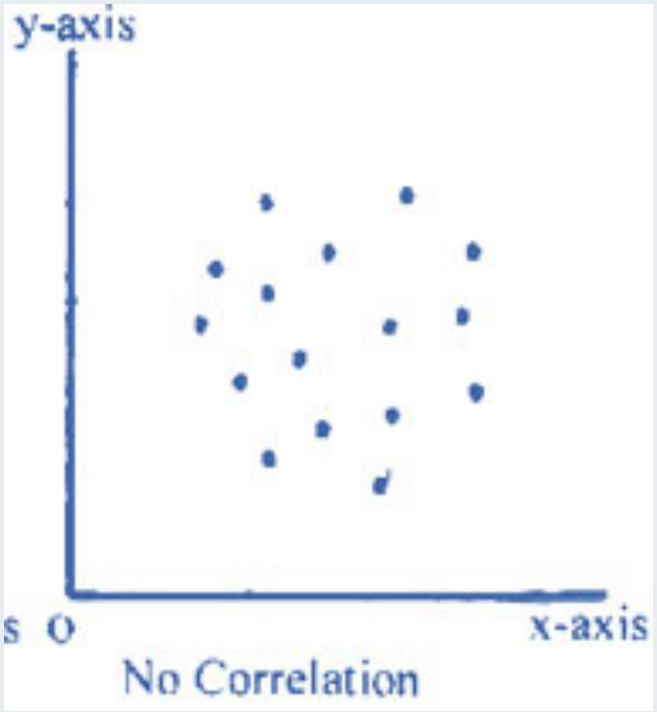


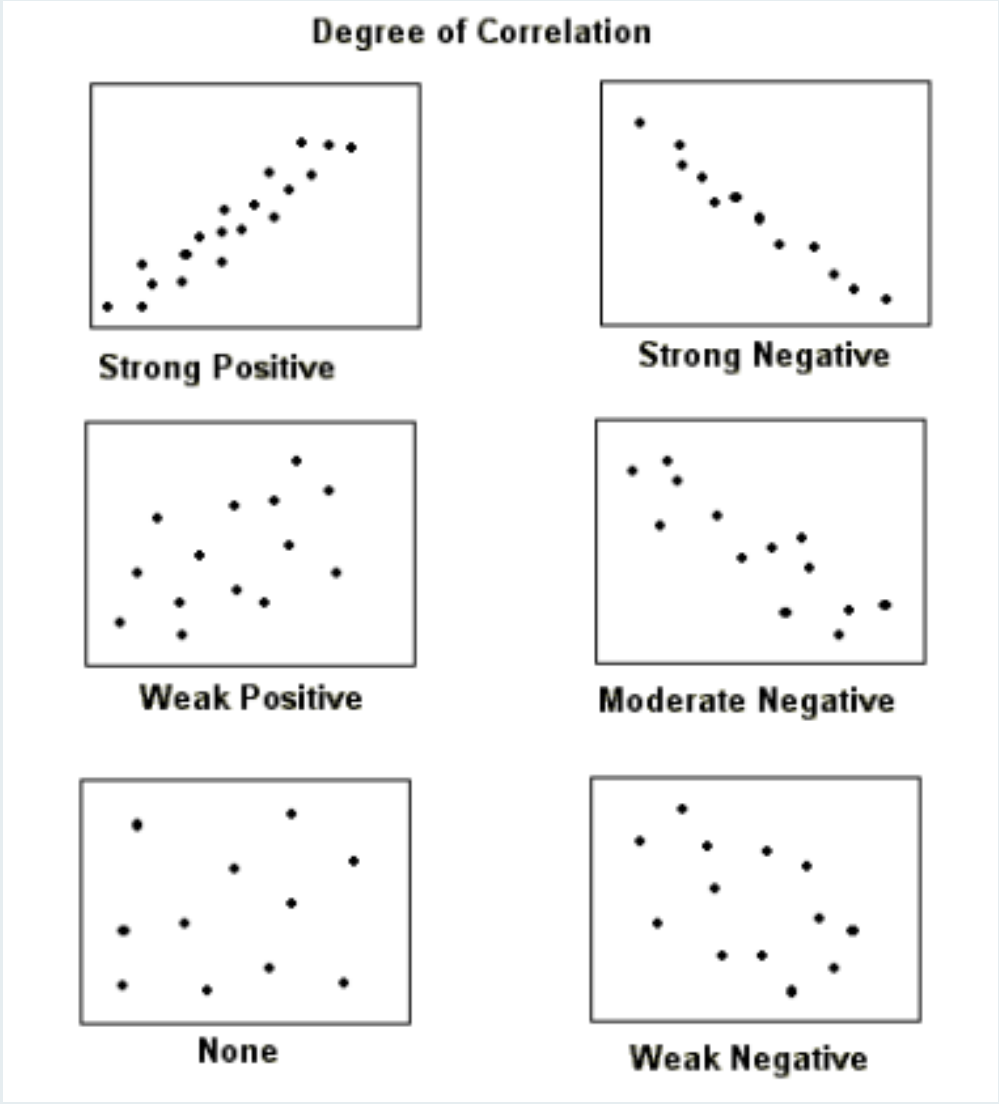


Correlation

There are 3 main types of correlation:

No correlation: The points do not make up any kind of general path. There is no line of best fit.




Degree of Correlation
Strong Positive
Strong Negative
Weak Positive
Moderate Negative
None
Weak Negative

Correlation

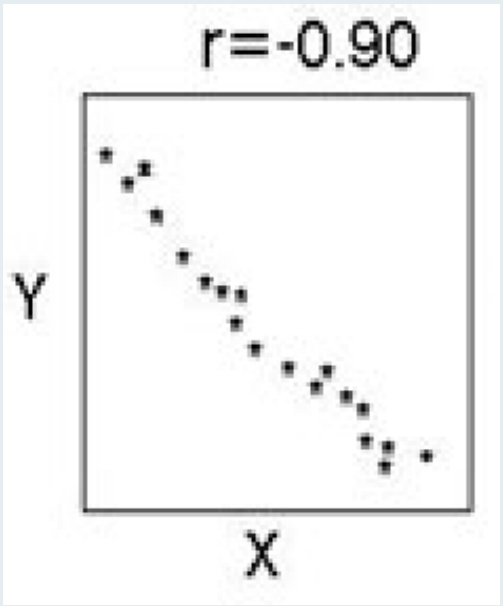
The correlation coefficient, r, can be anything between 1 and -1.

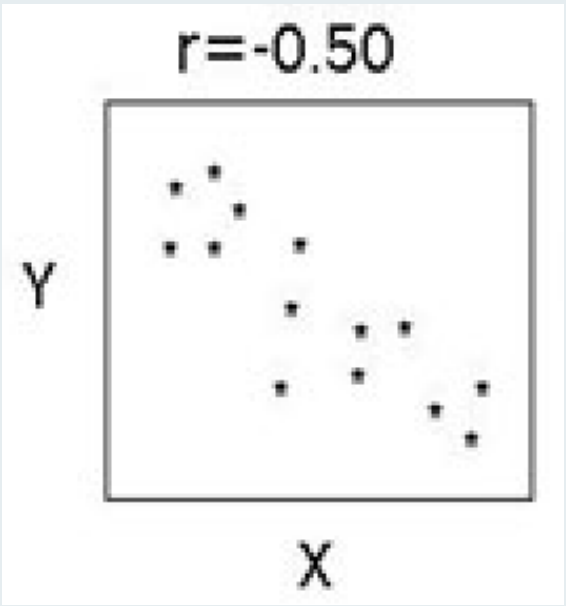
This number tells you exactly how strong or weak the relationship is, and which direction its going.

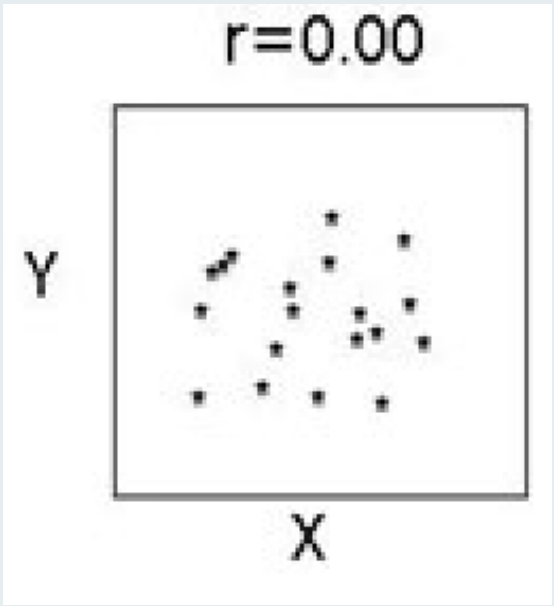
$r = 1$ is the strongest possible positive correlation .

$r = -1$ is the strongest possible negative correlation .

As r gets closer to 0, the relationship becomes weaker.

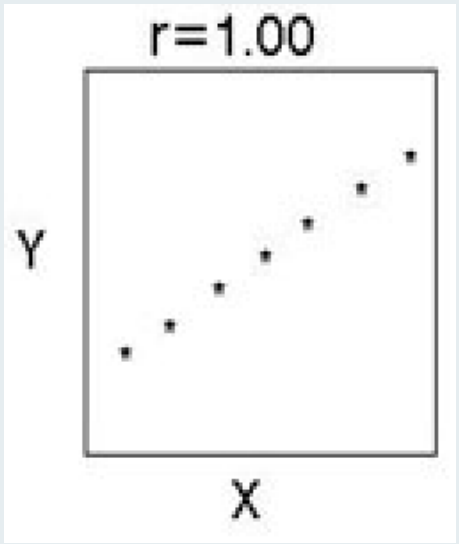


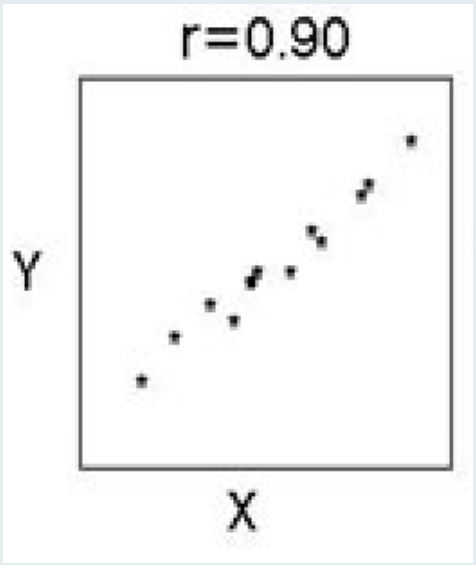


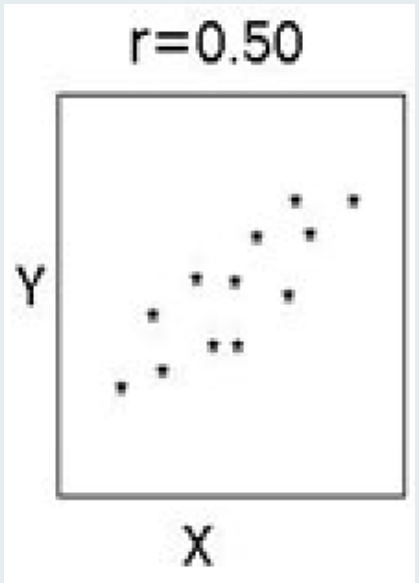


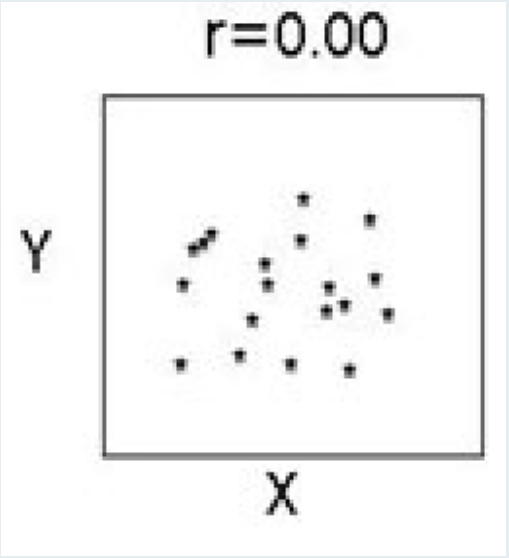
strong

weak





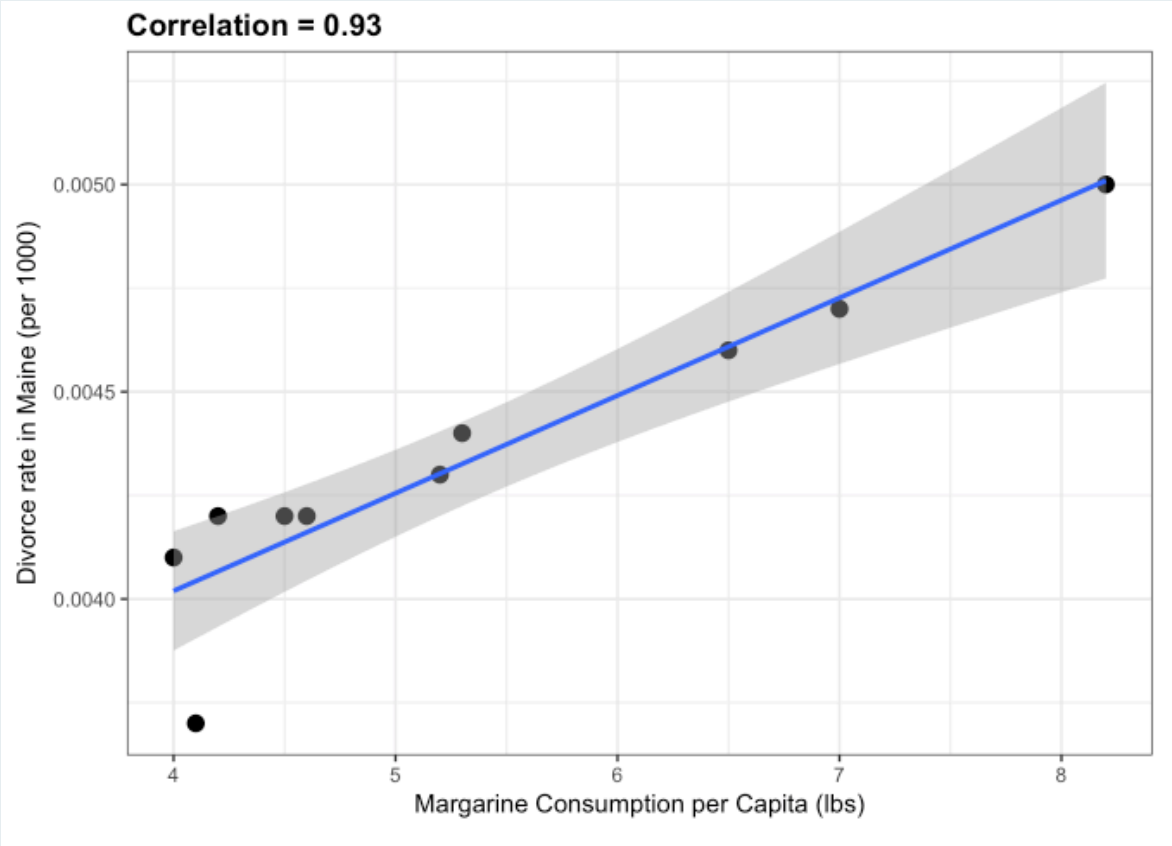




strong

weak

Correlation does NOT mean causation



Linear vs Quadratic???

Sometimes a quadratic function is a better fit for the data than a linear function.

The number of times that a school has won the national college basketball tournament is related to the number of times that the school has participated in the tournament. Here is the data for several schools:

Appearances	5	11	14	33	43	47
Championships Won	0	0	0	4	8	8

Let's look in Desmos

x_1	y_1
5	0
11	0
14	0
33	4
43	8
47	8

$y_1 \sim ax_1^2 + bx_1 + c$

STATISTICS

$R^2 = 0.9824$

RESIDUALS

e_1 plot

PARAMETERS

$a = 0.00428651$ $b = -0.0100238$

$c = -0.332501$

$y_1 \sim mx_1 + b$

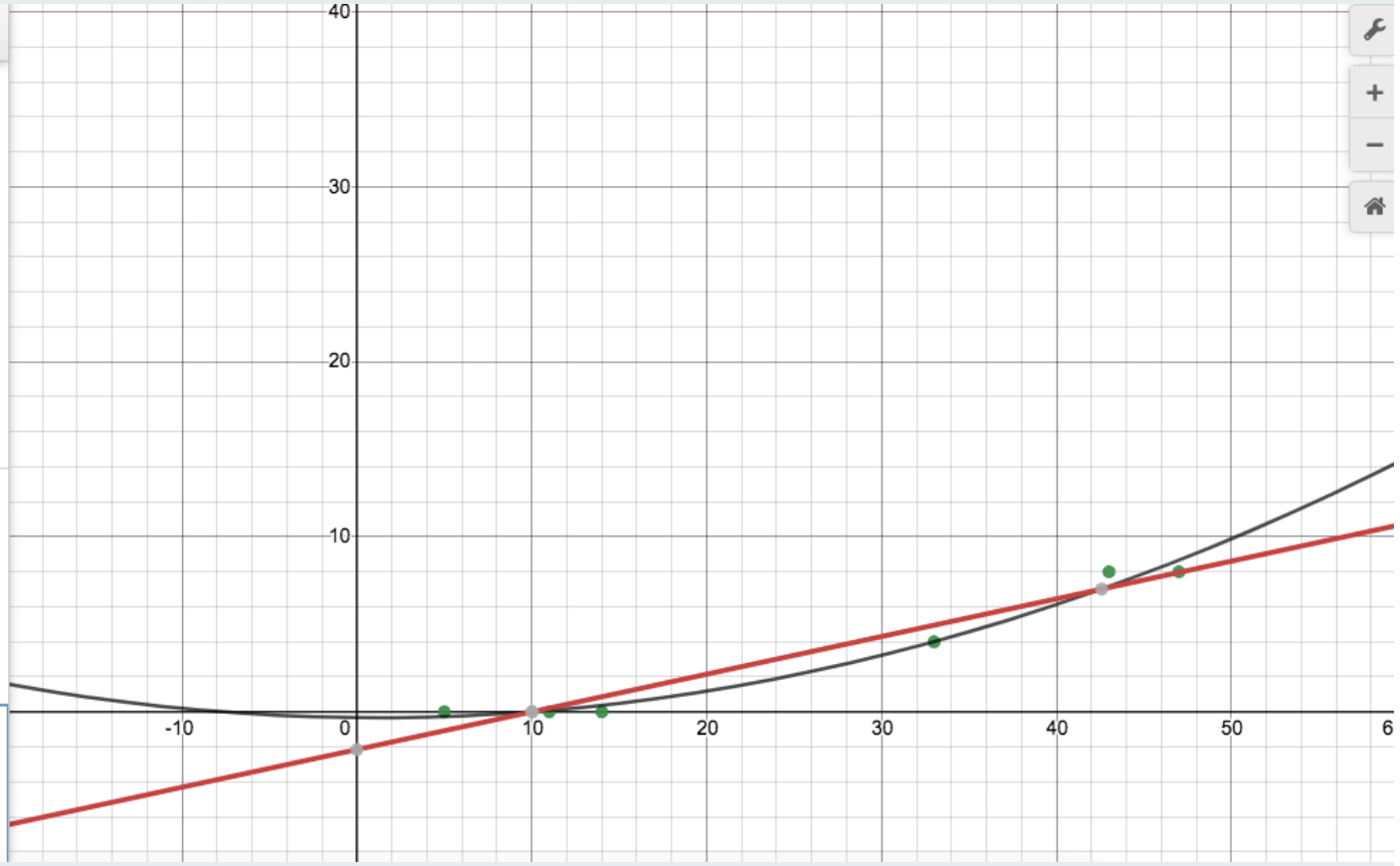
STATISTICS

$r^2 = 0.9527$

RESIDUALS

e_2 plot

$r = -0.9761$



$$y_1 \sim ax_1^2 + bx_1 + c$$

STATISTICS

$R^2 = 0.9824$

RESIDUALS

e_2 plot

PARAMETERS

$a = 0.00428651$ $b = -0.0100238$

$c = -0.332501$

$$y_1 \sim mx_1 + b$$

STATISTICS

$r^2 = 0.9527$

$r = 0.9761$

RESIDUALS

e_1 plot

PARAMETERS

$m = 0.215433$ $b = -2.16021$

$$y = 0.00428651x^2 - 0.0100238x - 0.332501$$

The number of times that a school has won the national college basketball tournament is related to the number of times that the school has participated in the tournament. Here is the data for several schools:

Appearances	5	11	14	33	43	47
Championships Won	0	0	0	4	8	8

We can use our "best fit" equation to make predictions.

a) According to the model, you would expect a school with 23 appearances to have won how many championships? Round your answer to the nearest whole number.

$$y = 0.00428651x^2 - 0.0100238x - 0.332501$$

$$y = 0.00428651(23)^2 - 0.0100238(23) - 0.332501$$

$$y = 0.00428651(529) - 0.2305474 - 0.332501$$

$$y = 1.70$$

The number of times that a school has won the national college basketball tournament is related to the number of times that the school has participated in the tournament. Here is the data for several schools:

Appearances	5	11	14	33	43	47
Championships Won	0	0	0	4	8	8

We can use our "best fit" equation to make predictions.

b) Using this model, a school with 60 appearances in the tournament would be expected to have won how many championships? Round your answer to the nearest whole number.

$$y = 0.00428651x^2 - 0.0100238x - 0.332501$$

$$y = 0.00428651(60)^2 - 0.0100238(60) - 0.332501$$

$$y = 0.00428651(3600) - 0.601428 - 0.332501$$

$$y = 14.498$$