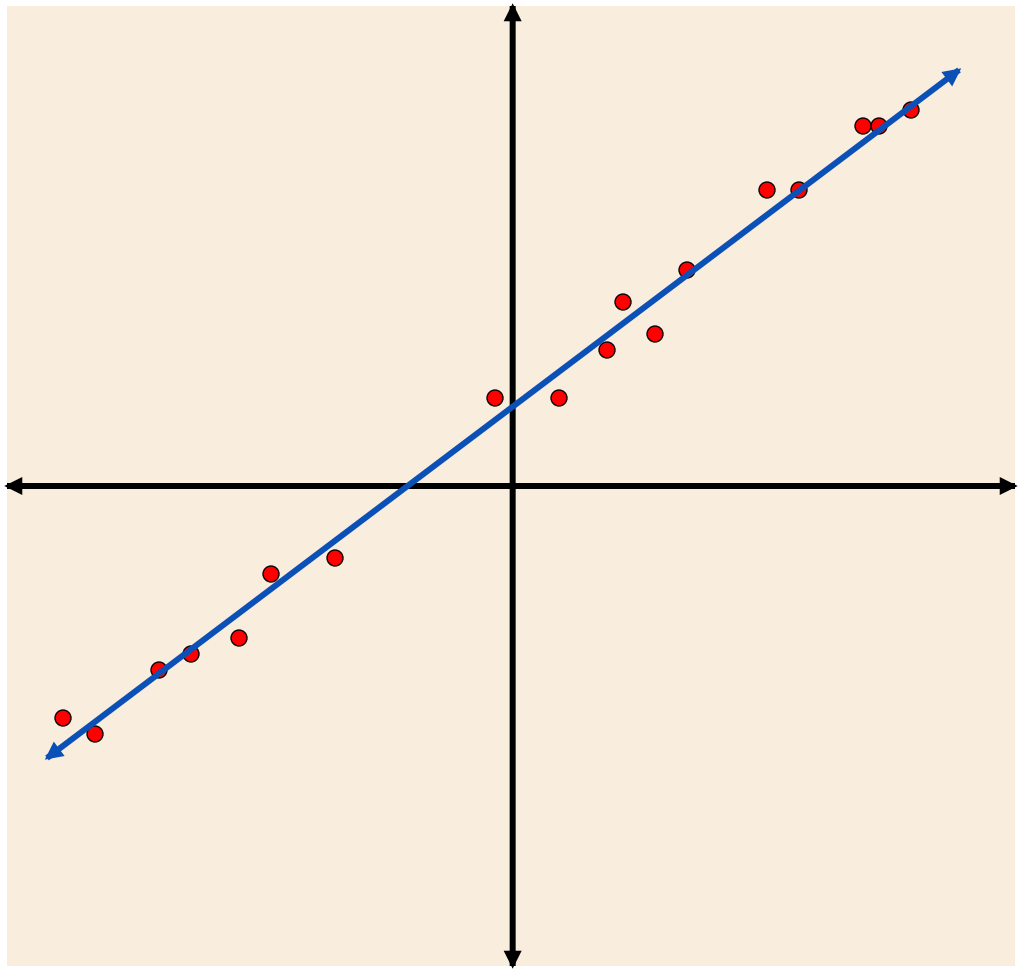
Scatter Plots and Line of Best Fit

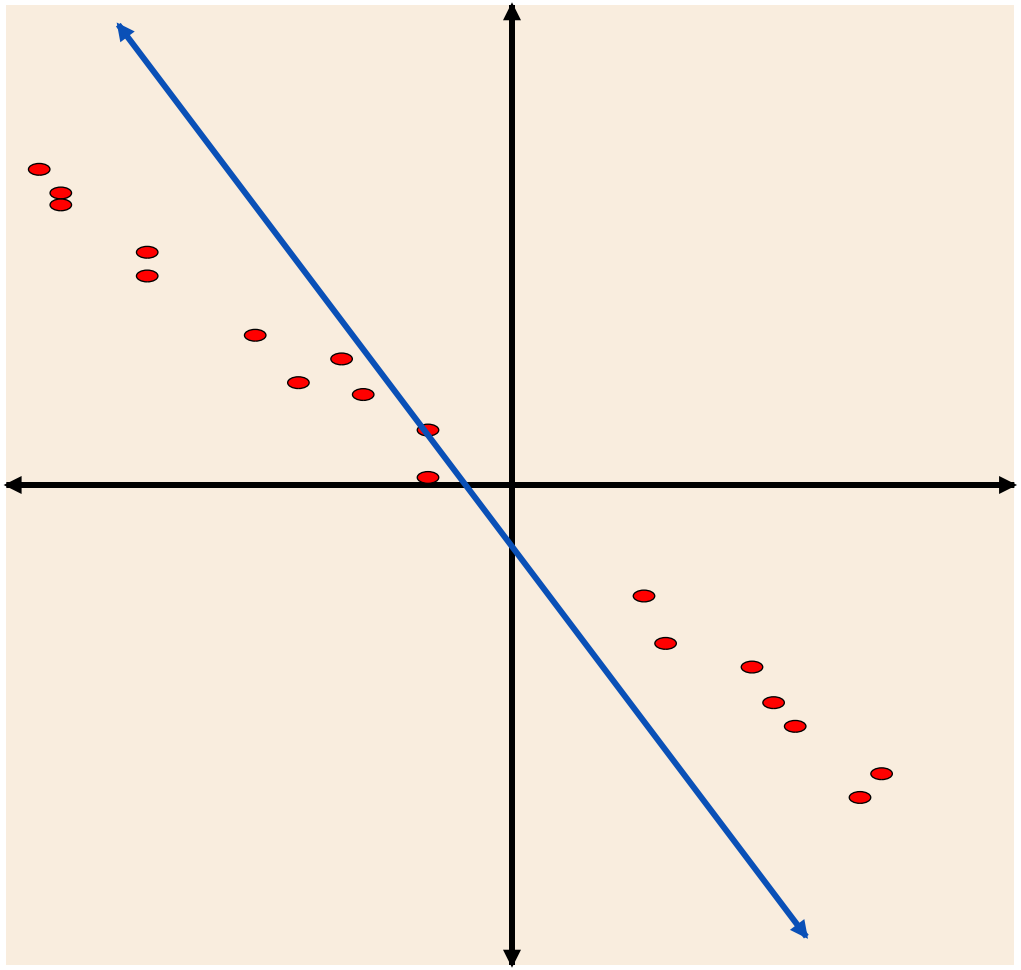
DETERMINING THE CORRELATION OF *X* AND *Y*

In this scatter plot, ***x*** and ***y*** have a **positive correlation**, which means that the points can be approximated by a line with a ***positive slope***.



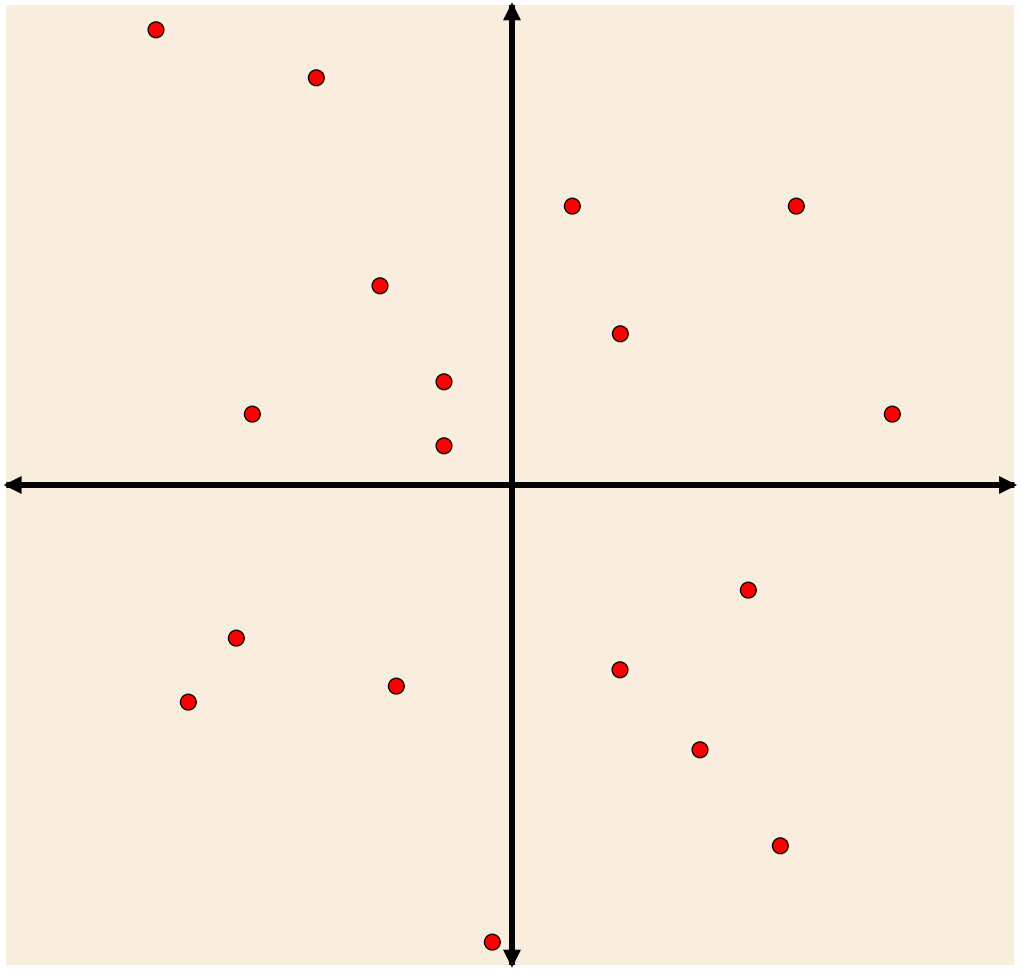
DETERMINING THE CORRELATION OF *X* AND *Y*

In this scatter plot, ***x*** and ***y*** have a **negative correlation**, which means that the points can be approximated by a line with a ***negative slope***.



DETERMINING THE CORRELATION OF *X* AND *Y*

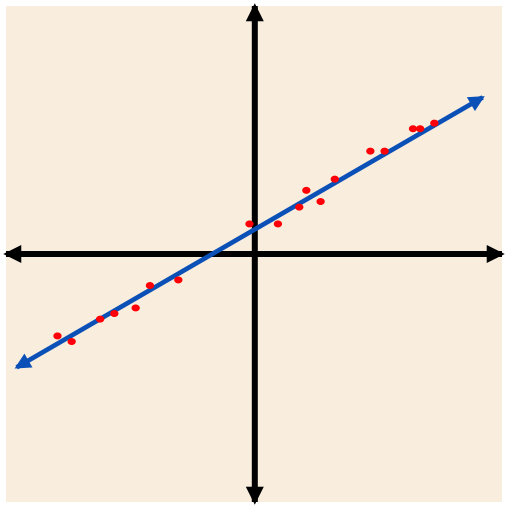
In this scatter plot, ***x*** and ***y*** have relatively **no correlation**, which means that the points ***cannot*** be approximated by a line.



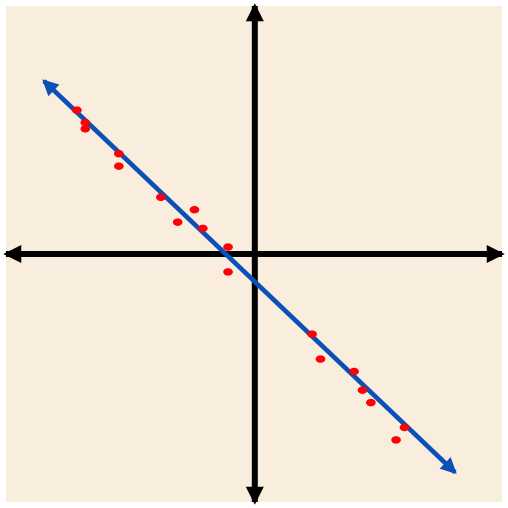
DETERMINING THE CORRELATION OF *X* AND *Y*

TYPES OF CORRELATION

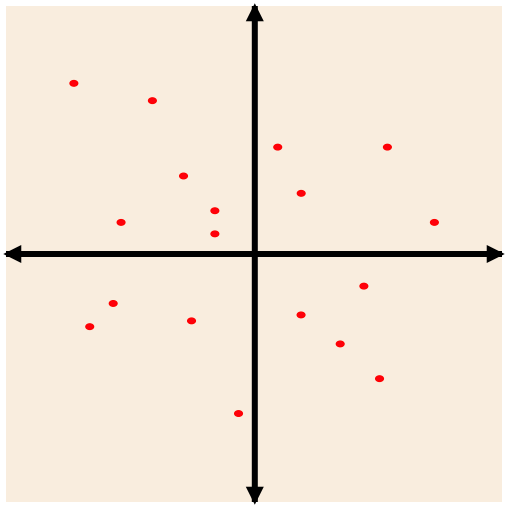
Positive Correlation



Negative Correlation



No Correlation



Line of Best Fit

line of best fit - The trend line that shows the relationship between two sets of data most

A graphing calculator computes the equation of a line of best fit using a method called linear regression.

The graphing calculator gives you the correlation coefficient ***r.***

-1 0 1

negative correlation

no correlation

positive correlation

Finding the Equation of Line of Best Fit

Example 1: Find an equation for the trend line and the correlation coefficient. Estimate the number of calories in a fast-food that has 14g of fat. Show a scatter plot for the given data.

Calories and Fat in Selected Fast-Food Meals

Fat(g)	6	7	10	19	20	27	36
Calories	276	260	220	388	430	550	633

Solution:

Use your graphing calculator to find the line of best fit and the correlation coefficient.

Cont (example 1)...

Step 1. Use the EDIT feature of the STAT screen on your graphing calculator.

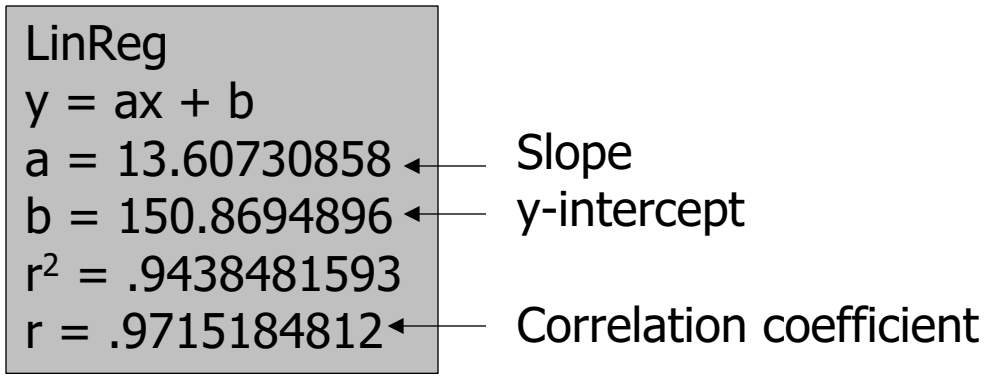
Enter the data for fat (L_1) and the data for Calories (L_2)

Calories and Fat in Selected Fast-Food Meals

Fat(g)	6	7	10	19	20	27	36
Calories	276	260	220	388	430	550	633

Cont (example 1)...

Step 2. Use the CALC feature in the STAT screen. Find the equation for the line of best fit ⇒ LinReg (ax + b)



The equation for the line of best fit is **$y = 13.61x + 150.87$** and the correlation coefficient ***r* is 0.9715184812**

Cont (example 1)…

Estimate the number of calories in a fast-food that has 14g of fat.

Solution:

Graph the Linear Regression

Y= , VARS, Statistics, EQ, RegEQ

***Highlight Plot 1**

ZOOM , 9(Zoom Statistics)

2nd, Trace value, _____, enter

y = 341.37

There is approximately 341g of calories when there is 14g of fat.

Finding the Equation of Line of Best Fit

Example 2. Use a graphing calculator to find the equation of the line of best fit for the data at the right. What is the correlation coefficient? Estimate the recreation expenditures in 2010.

Recreation Expenditures

Year	Dollars (Billions)
1993	340
1994	369
1995	402
1996	430
1997	457
1998	489
1999	527
2000	574

Let 1993 = 93

Answers:
$y = 32.33x - 2671.67$
$r = 0.9964509708$
The expenditures in 2010 will be 885 billions

Do these…

1. Find the equation of the line of best fit. Let 91 correspond to 1991. What is the correlation coefficient? Show a scatter plot. If the trend continues,, how much will the gross be in 2009?

Yearly Box Office Gross for Movies (Billions)

1991	1992	1993	1994	1995	1996	1997	1998	1999
$4.8	$4.9	$5.2	$5.4	$5.5	$6.0	$6.4	$7.0	$7.4

Answers: y = 0.33x – 25.35
r = 0.9751360069
$10.44 billions

Do these…

Use a graphing calculator to find the equation of line of best fit for the data. Find the value of the correlation coefficient *r*. Show a scatter plot for each data.

2. The data below represents the average July temperature and the annual precipitation of the cities. Estimate the average rainfall for a city with average July temperature of 75°F. Estimate the temperature if the ave. precipitation is 40 in.

City	Ave July Temperature (°F)	Ave Annual Precipitation (in.)
New York	76.4	42.82
Baltimore	76.8	41.84
Atlanta	78.6	48.61
Jacksonville	81.3	52.76
Washington, DC	78.9	39.00
Boston	73.5	43.81
Miami	82.5	57.55

Answers: $y = 1.58x - 76.74$; $r = 0.725197858$
About 41.45 in; about 74.08 °F

Do these…

Use a graphing calculator to find the equation of line of best fit for the data. Find the value of the correlation coefficient *r*.

3. Use the equation to predict the time needed to travel 32 miles on a bicycle. How many miles will he travel for 125 mins.

Speed on a Bicycle Trip

Miles	5	10	14	18	22
Time (min)	27	46	71	78	107

Answers: y = 4.56x + 2.83
r. = 0.9881161783
about 148.85 min or 149 min
26.77 or 27 miles.