

1A.2. Linear Regression

10F2

Linear Regression -- A method of finding a "line of best fit" to a set of points.

Correlation Coefficient r

$r < 0 \rightarrow$ negative correlation

$r > 0 \rightarrow$ positive correlation

$r^2 \approx 0 \rightarrow$ little or no correlation

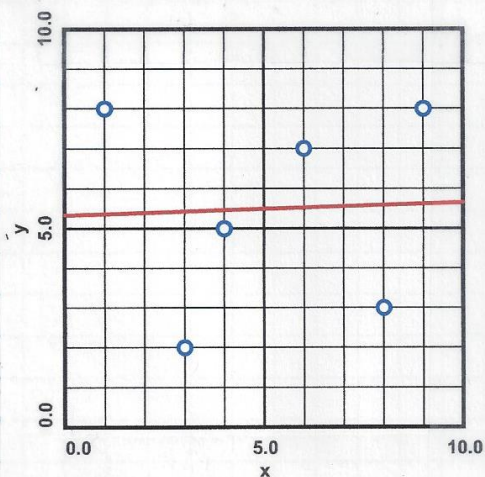
$r^2 = 1 \rightarrow$ perfect correlation

For Examples #1 through #3,

- Find the linear regression equation for the set of points.
- Graph the resulting linear equation
- Find r and r^2 .
- Is it positive or negative correlation?
- State if there is little correlation or if it is good correlation

Example #1.

SOLUTION:



(a) $y = 0.032x + 5.335$

(b) On graph

(c) $r = 0.0379$

$r^2 = 0.0014$

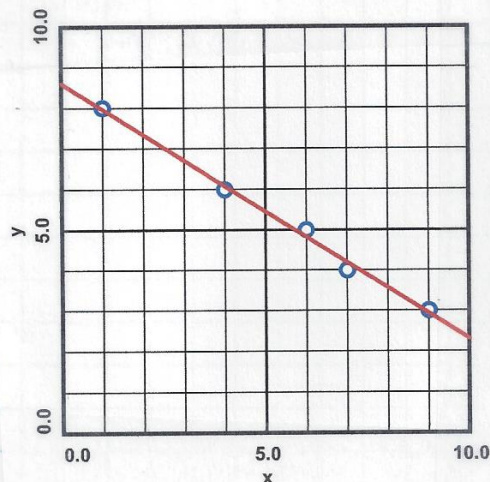
(d) positive correlation ($r > 0$)

(e) little correlation ($r^2 \approx 0$)

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2 of 2

Example #2.



SOLUTION:

(a) $y = -0.629x + 8.597$

(b) on graph

(c) $r = -0.9973$

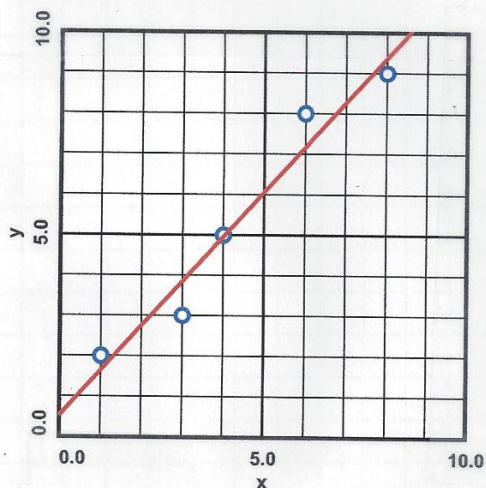
$r^2 = 0.9946$

(d) negative correlation

(the slope of the line is negative)

(e) good correlation ($r^2 \approx 1$)

Example #3.



SOLUTION:

(a) $y = 1.103x + 0.548$

(b) on graph

(c) $r = 0.9770$

$r^2 = 0.9545$

(d) positive correlation

(the slope of the line is positive)

(e) good correlation ($r^2 \approx 1$)

Example #4. Use linear regression to find the equation of the line which passes through the two points $(-2, -1)$ and $(4, 8)$.

SOLUTION:

$$y = 1.5x + 2 = \frac{3}{2}x + 2 \quad (\text{note that } r^2 = 1)$$