

AP Stats

Name _____

Unit 02 – Bivariate Data

Day 2 Notes

Correlation:

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-

$$r = \frac{1}{n-1} \sum \left(\frac{x_i - \bar{x}}{s_x} \right) \left(\frac{y_i - \bar{y}}{s_y} \right)$$

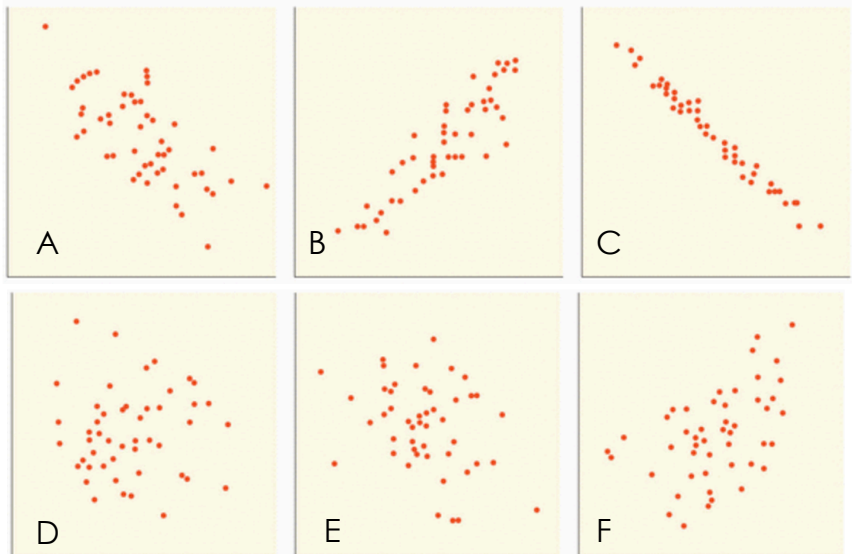
Facts about correlation:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

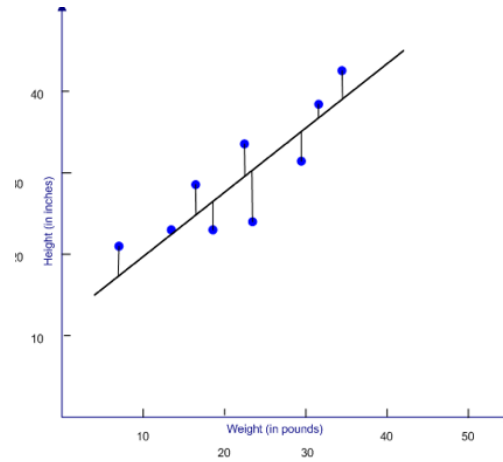
Example:

Match the correlation values of r with the appropriate graph.

1. $r = -0.99$
2. $r = -0.7$
3. $r = -0.3$
4. $r = 0$
5. $r = 0.5$
6. $r = 0.9$

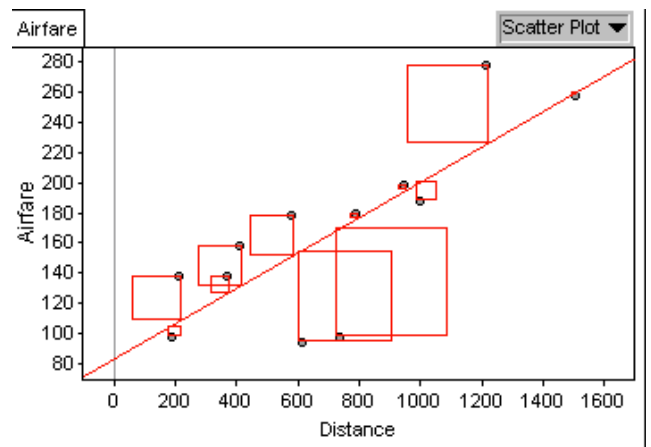


Regression Line:



Least-Squares Regression Line (LSRL):

- As the plots to the right illustrate, the LSRL makes the squares of the vertical distance as small as possible.



Equation for the LSRL: $\hat{y} = a + bx$

With slope $b = r \frac{s_y}{s_x}$ and intercept $a = \bar{y} - b\bar{x}$

Where: $r =$
 $s_x =$
 $s_y =$
 $\bar{x} =$
 $\bar{y} =$

R^2 - the coefficient of determination:

-
-

Facts about the least-squares regression:

- 1.
- 2.
- 3.
- 4.

Example:

Ninth grade students at BHS go on a backpacking trip each fall. Students are divided into hiking groups with 8 people by selecting names from a hat. Before leaving students and their backpacks were weighed. Here are the data from one hiking group in a recent year:

Body	120	187	109	103	131	165	158	116
Backpack	26	30	26	24	29	35	31	28

Find the following piece of information:

a) Correlation Coefficient (calculator) _____

b) R^2 and what it means in context _____

c) LSRL equation (calculator) _____

Example: Does Fidgeting Keep you Slim?

Some people don't gain weight even when they overeat. Perhaps fidgeting and other "non-exercise activity" (NEA) explains why- some people may spontaneously increase non-exercise activity when fed more. Researchers deliberately overfed 16 healthy young adults for 8 weeks. They measured fat gain (in kilograms) as the response variable and change in energy use (in calories) from activity other than deliberate exercise-fidgeting, daily living, and the like- as the explanatory variable. Here are the data:

NEA (cal)	-94	-57	-29	135	143	151	245	355	392	473	486	535	571	580	620	690
Fat Gain (kg)	4.2	3.0	3.7	2.7	3.2	3.6	2.4	1.3	3.8	1.7	1.6	2.2	1.0	0.4	2.3	1.1

a) Find the mean of the explanatory and response variables (label them \bar{x} and \bar{y})

b) Find the standard deviation of the explanatory and response variables (label them s_x and s_y)

c) The correlation $r = -.78$. Using the formula, create a LSRL equation.

d) Do people with larger increases in NEA tend to gain less fat? Explain your reason.

e) Determine the value of R^2 and explain what it means in context.

INCLUDE SOMETHING HERE ABOUT USING A MINITAB OUTPUT TABLE!!!