

BELLWORK!

Do male college students follow their school's teams more closely than females?

*project proposals

	Whole Game	Part of Game	None of It	Total
Male	10	12	4	26
Female	21	24	30	75
Total	31	36	34	101

- a) What is the explanatory variable? *gender*
 b) What is the response variable? *games*
 c) Find the conditional proportions of each gender:

	Whole Game	Part of Game	None of It
Male	<i>.323</i>	<i>.462</i>	<i>.15</i>
Female	<i>.28</i>	<i>.32</i>	<i>.4</i>

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WELCOME!

On your desk:

- notebook
- ~~- bellwork~~
- 2 colored markers

vocabulary

examples



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HOMEWORK ?'s

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Section 3.2
Exploring the Association
Between Two Quantitative Variables



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Learning Objectives:

- Constructing scatterplots
- Interpreting a scatterplot
- Correlation
- Calculating correlation

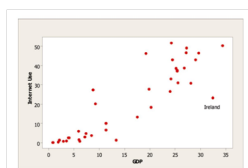


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Scatterplot

Graphical display of relationship between two quantitative variables:

Horizontal Axis: *Explanatory variable, x*
Vertical Axis: *Response variable, y*



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Quick – we need data!

I need about 10 people to tell me how many aunts they have and how many cousins they have!

Can you even count this? ☺ Maybe people without HUGE families...



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Calculator Commands

1. Enter x values into L1 & y values into L2
2. STAT PLOT --> Turn on Scatter Plot with L1 & L2
3. ZOOM 9



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Practice Example

Make a scatterplot on your calculator using the following data:

<u># of hours spent at gym/week</u>	<u>% body fat</u>
6	19%
14	14%
0	25%
7	16%
3	18%



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Interpreting Scatterplots

You can describe the overall pattern of a scatterplot by the **trend**, **direction**, and **strength** of the relationship between the two variables

- Trend:** linear, curved, clusters, no pattern
- Direction:** positive, negative, no direction
- Strength:** how closely the points fit the trend

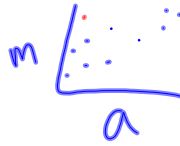


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"We Do" Example

100 cars on the lot of a used-car dealership

Would you expect a positive association, a negative association or no association between the age of the car and the mileage on the odometer?



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Practice Example

Time spent studying for a test

Would you expect a positive association, a negative association or no association between the amount of time you spend studying for a test and the grade you earn on a test?



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Think About It...

What type of association would you expect for the number of times a forward in soccer takes a shot at the goal and the number of times he actually scores?

Let's find the correlation coefficient. This is called "r."



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Correlation Coefficient (r)

Measures the strength and direction of the linear association between x and y

A positive r value indicates a positive association

A negative r value indicates a negative association

$r = -.85$ $r = .85$

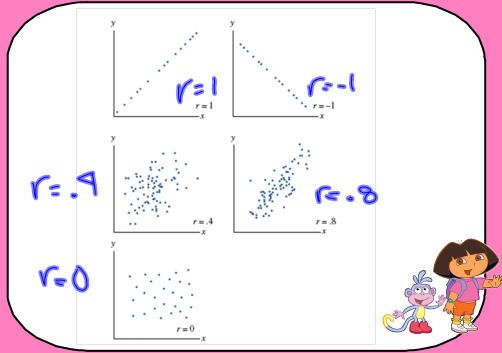
An r value close to +1 or -1 indicates a strong linear association

An r value close to 0 indicates a weak association



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Some Examples...



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Practice Example

Rank these correlation coefficients from weakest to strongest:

~~-.24~~, ~~.56~~, .9, ~~-.8~~, ~~-.23~~, ~~-1.0~~

-.23, -.24, .56, -.8, .9, -1

Weakest \longrightarrow Strongest

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Correlation Coefficient

A horizontal number line with arrows at both ends, ranging from -1 to 1. Major tick marks are at -1, -.5, 0, .5, and 1. Brackets above the line indicate correlation strength: a red bracket from -1 to -.5 is labeled 'strong'; a blue bracket from -.5 to 0 is labeled 'Weak'; and a red bracket from 0 to 1 is labeled 'strong'. The word 'strong' is also written below the line in the corresponding intervals.

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Steps to Find r:

1. Find the mean and standard deviation for each list.
2. Use this information to find the z-score of each value in each list.

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Steps to Find r:

3. Multiply these scores together and add them all up.

4. Divide this by n-1.

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



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Example

<u>Shots at the Goal</u>	<u>Goals</u>
8	0
9	2
10	1
11	3
12	3



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Practice Example

<u># of hours spent at gym/week</u>	<u>% body fat</u>
6	19%
14	14%
0	25%
7	16%
3	18%

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BUT...

... Ms. Andrejko! Can't we just do this in our calculator like everything else??



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DIAGNOSTICS ON!!!

First, your Diagnostics have to be on.

To do this, type 2nd, 0 (which says Catalog).

Scroll down to DiagnosticOn

Hit Enter twice

It should say Done



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Calculator Commands

Enter x data into L1 & Enter y data into L2

STAT CALC menu

Choose 8: LinReg(a+bx)

(L1,L2)

Enter




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Practice Example

<u>Shots at the Goal</u>	<u>Goals</u>
8	0
9	2
10	1
11	3
12	3
13	0


r = -.19
r = .85



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Practice Example

What happens to r if I add the point for 13 kicks but 0 goals? (Add 13 to List1 and 0 to List2)



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Practice Example

Team	Batting Average	Team Scoring
Boston	0.269	5.1
Toronto	0.284	5.0
Minnesota	0.287	4.9
Kansas City	0.271	4.7
Seattle	0.272	4.7
New York	0.285	5.7
Los Angeles	0.274	4.7
Baltimore	0.277	4.7
Texas	0.278	5.2
Tampa Bay	0.255	4.3
Chicago	0.280	5.4
Oakland	0.260	4.8
Cleveland	0.280	5.4
Detroit	0.274	5.1

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r... in review

Talk with a partner and summarize what you have learned about r (correlation)



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r... in review

Always falls between -1 and 1

The closer r is to -1 and 1, the stronger the association
The closer r is to 0, the weaker the association

Sign of correlation denotes direction
*(-) indicates negative linear association
*(+) indicates positive linear association

Correlation has unitless measure

Not resistant to outliers



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Homework

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