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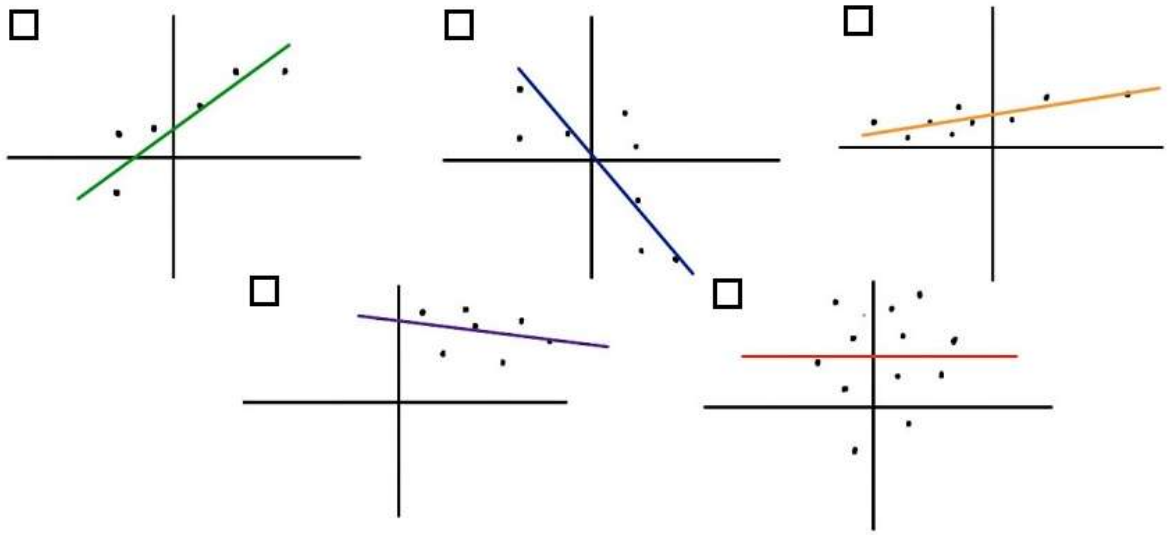
Problem Set – Lesson 14

Q1.

Which of the following relationships have a positive direction?



Q2.

Order the correlation coefficients from weakest to strongest.

r values

0.21

-0.56

-1.00

0.62

-0.04

_____, _____, _____, _____, _____

(weakest) (Strongest)

Q3.

If people know more about a particular prescription drug, are they more likely to desire it? Callaghan, Laraway, Snycerski, and McGee (2013) investigated this by correlating a numerical score for knowledge about the drug (with higher scores indicating more knowledge) and self-reported desire to seek that drug from a doctor (also numerical, with higher numbers indicating greater desire to seek the medication). In a condition in which participants viewed a TV commercial for the drug, the relationship between drug-knowledge scores and drug-seeking scores was negatively correlated with r = -.25 (95% CI = -.37, -.12). What does this mean?

- Knowing more about the drug was associated with desiring the drug more
- Knowing more about the drug was associated with desiring the drug less

Q4.

A confidence interval for the true population correlation coefficient (ρ) is (0.62, 0.98).

Which of the following is the most unlikely value of ρ?

- 0.78
- 0.83
- 0.59
- 0.98

Q5.

A confidence interval for the true population correlation coefficient (ρ) is (0.62, 0.98).

In this case, we would

- Reject the null
- Fail to reject the null

Reminder: $H_0: \rho = 0$

$H_A: \rho < 0$ or $\rho > 0$ or $\rho \neq 0$

Q6.

We do a hypothesis test for the true population correlation coefficient (ρ) and calculate our t-statistic to be 2.306.

If there were 45 data values in our study (45 x-values and 45 y-values), we

- Reject the null
- Fail to reject the null

This means we're pretty sure there

- is
- is not

a true linear relationship between x and y.

Q7.

https://docs.google.com/spreadsheets/d/1FYqIrYTLK4rvNYY0qSPBEIQRRnddCZPJp79dpPSSgU/edit?usp=sharing

Open the Google spreadsheet.

r =

This relationship is

- Strong
- weak

and goes in the

- positive
- negative

direction.

Q8.

Are the following examples of correlations positive or negative?

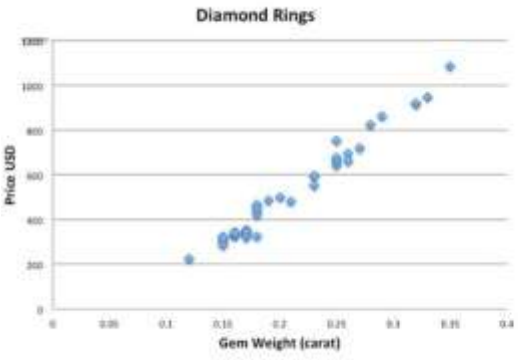
	Positive	Negative
As a person runs more miles, they report more intense leg pain.		
As employees work more hours on a shift, their productivity decreases.		
As a person drinks more coffee, their ability to focus decreases.		
The greater the square footage of one's home, the more costly it is to heat.		

Q9.

Which of the following pairs of variables should produce a correlation near 0?

- ☐ Engine mileage and price of used vehicles
- ☐ Males' hair length and body weight
- ☐ Amount of exercise and risk of heart disease
- ☐ Commuting distance and cost per month for gas

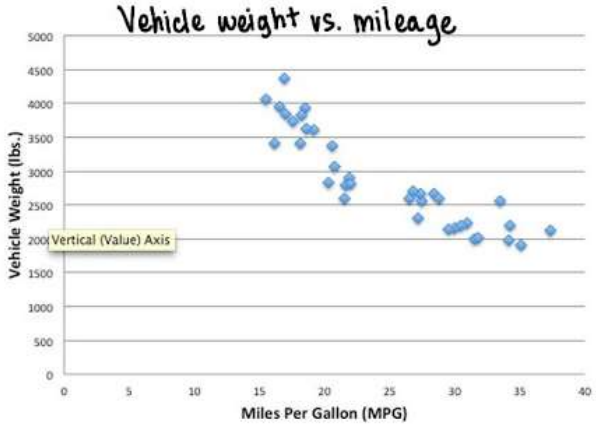
Q10.



This scatterplot shows the relationship between a diamond's weight (in carats) and its cost. Does this show a positive or negative relationship?

Positive
Negative

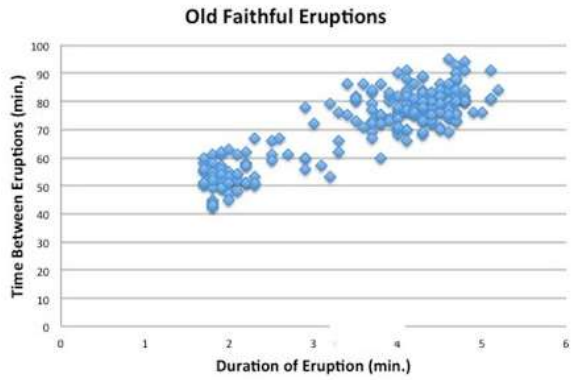
Q11.



This scatterplot shows the relationship between vehicle weight (lbs) and gas mileage (MPG). Which of the following values is closest to the correlation for these data?

0.85
0.55
-0.35
-0.90

Q12.



This scatterplot shows the relationship between the time between eruptions of the Old Faithful geyser and the eruption's duration. Which of the following values is closest to the correlation for these data?

- ☐ -0.87
- ☐ -0.37
- ☐ 0.37
- ☐ 0.87

Q13.

As the size of our sample increases, the size of the Pearson correlation coefficient (r) that we will need to reach significance

- Stays the same
- Gets smaller
- Gets larger
- Sample size does not affect Pearson's r

Q14.

https://docs.google.com/spreadsheets/d/1OYiXiAgwMeqGZHCq3prSq8BUUu2CWe8ujYn0lAE3elY/edit?usp=sharing

The data in the Google spreadsheet is average gestation period (how long a fetus remains in the womb) and longevity (how long animals live) for a sample of different types of animals. (Source: The World Almanac and Book of Facts, 2006)

Create a scatterplot. Does there appear to be a positive or negative relationship between gestation period and longevity?

- Positive
- Negative

Q15.

Based on the scatterplot, estimate the correlation coefficient. (Estimate, do not calculate.)

$r \approx$

Q16.

Now, use the function =PEARSON in the Google Spreadsheet to calculate the correlation coefficient.

r =

Q17.

What percentage of the variability in longevity can be explained by the variability in gestation periods? (Hint: Recall the coefficient of determination.)

_____%

Q18.

calculate the p-value for the correlation coefficient you calculated. Which most closely approximates this p-value?

$p > 0.001$
$p > 0.0001$
$p < 0.0001$
$p < 0.01$

Q19.

Based on the p-value, what is your statistical decision?

- ☐ Reject the null
- ☐ Retain the null

Q20.

What can we conclude about the relationship between gestation period and longevity? (Choose all that apply)

- ☐ Animals that gestate longer tend to live shorter lives
- ☐ Animals that gestate longer tend to live longer
- ☐ Animals that live longer tend to gestate longer
- ☐ Long gestation periods tend to cause greater longevity.

Q21.

Use GraphPad QuickCalcs (link below) to determine the p-value for a Pearson correlation coefficient of $r = 0.385$ from a sample of $n = 30$. What would be your statistical decision at $\alpha = 0.05$ and $\alpha = 0.01$?

- ☐ Reject the null at both $\alpha = 0.05$ and $\alpha = 0.01$
- ☐ Reject the null at $\alpha = 0.05$ but not at $\alpha = 0.01$
- ☐ Retain the null at both $\alpha = 0.05$ and $\alpha = 0.01$
- ☐ Reject the null at $\alpha = 0.01$, but not at $\alpha = 0.05$