9 A	1. Correlation: positive vs. negative

Describe a realistic situation in which two variables would have a **high positive correlation**.

Describe another situation for which the correlation would be **highly negative**.

9 A	2. Association does NOT imply causation, in observational studies

A recent medical study found that the moderate consumption of alcoholic beverages is **associated with** the fewest heart attacks (as compared to heavy drinking or no drinking).

It was suggested that the alcohol caused the **beneficial effects**.

Devise an **explanation** for this relationship that assumes there is **no direct causal link** between drinking alcohol and having a heart attack. *(Hint : Consider personality.)*

9 A *7. Low Pearson's r

A psychologist is studying the relationship between the reported vividness of visual imagery and the ability to rotate objects mentally. A sample of graduate students at a leading school for architecture is tested on both variables, but the Pearson's r turns out to be **disappointingly low**.

Which of the following is the most likely explanation for why Pearson's r was **not higher**?

- ☐ a.) One or both of the variables has a restricted range.
- ☐ b.) The relationship between the two variables is curvilinear.
- ☐ c.) The number of degrees of freedom is too small.
- ☐ d.) One variable was just a linear transformation of the other.

9 B *5. Test for Association: Pearson's r — Code: R notebook

A psychiatrist has noticed that the schizophrenics who have been in the hospital the longest score the lowest on a mental orientation test. The data for 10 schizophrenics are listed in the following table:

Years of Hospital (X)	Orientation Test (Y)
5	22
7	26
12	16
5	20
11	18
3	30
7	14
2	24
9	15
6	19

a) Calculate **Pearson's r** for the data.

r = _____

b) Test for statistical significance at the **.05** level (**two**-tailed). (SPSS)

- ☐ Evidence of linear association
- ☐ No such evidence

2-tail: p = _____

9 B *6. Reliability: Pearson's r for test-retest scores — Code: R notebook

If a test is reliable, each participant will tend to get the same score each time he or she takes the test. Therefore, the correlation between two administrations of the test (test-retest reliability) **should be high**. The **reliability** of the verbal GRE score was tested using five participants, as shown in the following table:

Verbal GRE (1)	Verbal GRE (2)
540	570
510	520
580	600
550	530
520	520

a) Calculate **Pearson's r** for the test-retest reliability of the verbal GRE score.

r = _____

b) Test for statistical significance at the **.05** level (**one**-tailed).

- ☐ Evidence of linear association
- ☐ No such evidence

1-tail: p = _____

Would this correlation be significant with a **two**-tailed test?

- ☐ Evidence of linear association
- ☐ No such evidence

2-tail: p = _____

9 C	1. Scatterplot: estimate Pearson's r	Code: R notebook

a) Create a scatter plot of **phobia** (X) versus **statquiz** (Y).

From looking at the plot, do you think the **Pearson's r** will be:

☐ positive -or- ☐ negative | ☐ Large -or- ☐ medium -or- ☐ small?

b) Create a scatter plot of **baseline anxiety** (X) versus **postquiz anxiety** (Y).

From looking at the plot, do you think the **Pearson's r** will be:

☐ positive -or- ☐ negative | ☐ Large -or- ☐ medium -or- ☐ small?

9 C	2. Calculate Pearson's r	Code: R notebook

a) Compute the Pearson's r between **phobia** (X) versus **statquiz** (Y), for ALL students. **r = _____**

Also, compute the Pearson's r between **baseline anxiety** (X) versus **postquiz anxiety** (Y). **r = _____**

b) Use **dplyr::filter()** to **delete** any student whose baseline anxiety is **over 29**, and repeat part b of the first exercise:

Create a scatter plot of **baseline anxiety** (X) versus **postquiz anxiety** (Y).

From looking at the plot, do you think the **Pearson's r** will be:

☐ positive -or- ☐ negative | ☐ Large -or- ☐ medium -or- ☐ small?

Also, re-run the Pearson's r between **baseline anxiety** (X) versus **postquiz anxiety** (Y). **r = _____**

What **happened** to the Pearson's r?

Use the **change in the scatter plot** to explain the change in the correlation coefficient.

9 C	3. Calculate Pearson's r, report APA style	Code: R notebook

a) Compute Pearson's r s among the **three measures of anxiety**. Write up the results in **APA style.**

b) Compute the **average of the three measures of anxiety**, and then compute the correlation between each measure of anxiety and the average, so that the output contains a **single column** of correlations.

Anxiety Measure	Average Anxiety
Baseline	**r =** _____
Pre-quiz	**r =** _____
Post-quiz	**r =** _____

9 C	4. Pearson's r: Missing values	Code: R notebook

a) Compute Pearson's r for the following list of variables:

Mathquiz
Statquiz
phobia

	Mathquiz	Statquiz	phobia
Mathquiz			
Statquiz	**r =** _____		
phobia	**r =** _____	**r =** _____	

b) Repeat part a after selecting **Exclude cases listwise**

	Mathquiz	Statquiz	phobia
Mathquiz			
Statquiz	**r =** _____		
phobia	**r =** _____	**r =** _____	

Which correlation was **changed**? Explain **why**.