30 Correlation and Causation Practice Questions

Topic 77 | Fictional research data | November 2026

Level 1 — Foundations (1–10)

Question 1. Define correlation

What is a statistical correlation?

Space for reasoning: _____

Question 2. Define causation

What question distinguishes causation from association?

Space for reasoning: _____

Question 3. Main difference

Can a correlation alone establish what would happen if X were changed?

Space for reasoning: _____

Question 4. Positive correlation

A scatterplot slopes upward. Describe its linear association.

Space for reasoning: _____

Question 5. Negative correlation

As X increases, Y tends to decrease. Which direction is this?

Space for reasoning: _____

Question 6. Zero Pearson correlation

For X=-2,-1,0,1,2 and Y=X squared, what is Pearson r?

Space for reasoning: _____

Question 7. Read a scatterplot

What four features should be examined before interpreting r?

Space for reasoning: _____

Question 8. Perfect positive

Interpret r=+1 for paired quantitative variables.

Space for reasoning: _____

Question 9. Perfect negative

Interpret r=-1.

Space for reasoning: _____

Question 10. Strong not causal

Why does r=.95 alone not prove an intervention effect?

Space for reasoning: _____

Level 2 — Calculations and Reasoning (11–20)

Question 11. Two means

For X=1,2,3,4,5 and Y=2,4,6,8,10 calculate means.

Space for reasoning: _____

Question 12. Crossproducts

Calculate sum of (x-3)(y-6) for the five positive pairs.

Space for reasoning: _____

Question 13. Pearson calculation

Compute Pearson r from sums 20,10,40.

Space for reasoning: _____

Question 14. Moderate association

What does observed r=.60 mean?

Space for reasoning: _____

Question 15. Confounder

How might prior preparation confound study hours and final grades?

Space for reasoning: _____

Question 16. Reverse causation

A sample shows extra tutoring and lower grades. Does tutoring cause lower grades?

Space for reasoning: _____

Question 17. Spurious relationship

Why could two unrelated variables trending upward over time appear correlated?

Space for reasoning: _____

Question 18. Pearson versus Spearman

How do Pearson and Spearman differ?

Space for reasoning: _____

Question 19. Outlier influence

In x=1..10,y=2x, replace final y=20 by -15. What happens to r?

Space for reasoning: _____

Question 20. Nonlinear dependence

How can r=0 coexist with y=x squared?

Space for reasoning: _____

Level 3 — Advanced and Research Design (21–30)

Question 21. Interpret the main data

What is the sample size and Pearson study-hours/final-score coefficient?

Space for reasoning: _____

Question 22. Stratified comparisons

After splitting by median prior score 58.7, what are hours/score correlations?

Space for reasoning: _____

Question 23. Simpson reversal

Find Method A and B overall pass rates given A 43/100 and B 77/100.

Space for reasoning: _____

Question 24. Sampling versus assignment

Explain random sampling versus random treatment assignment.

Space for reasoning: _____

Question 25. Evaluate randomized trial

Can random assignment alone guarantee valid causal results?

Space for reasoning: _____

Question 26. Confounder, mediator, collider

Given C->X,C->Y; X->M->Y; X->S<-Y, identify C,M,S.

Space for reasoning: _____

Question 27. Selection bias

Why might surveying only students who voluntarily join a research club bias a campus estimate?

Space for reasoning: _____

Question 28. Statistical significance

If Pearson test reports p=.01, does that prove study hours cause score improvement?

Space for reasoning: _____

Question 29. Better study design

Propose a design to evaluate an optional practice resource.

Space for reasoning: _____

Question 30. Evidence-based conclusion

Write a responsible summary of the 240-student synthetic project.

Space for reasoning: _____