

### Directions and Sample Questions for Final Exam

#### Part I: Correlation

##### A. Indicate the *best* answer to each the following multiple-choice questions (20 points)

1. Correlations are

- a) useful because they always relate score variables.
- b) not useful because they do not demonstrate causal relations.
- c) useful because they can be used to make predictions.
- d) not useful when they are negative.

2. To make a prediction from a new value of the predictor variable based on a correlation between two score values, you

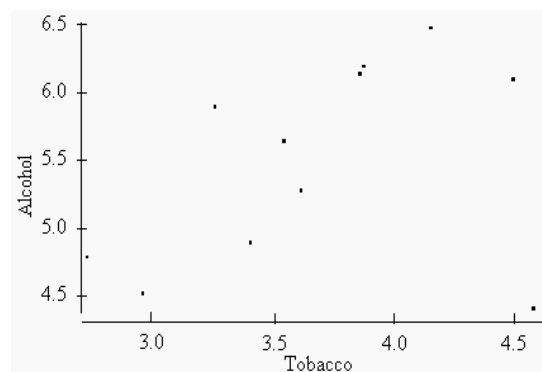
- a) multiply the Pearson correlation coefficient by the new predictor value and add the value of the y-intercept.
- b) multiply the new predictor value by the slope of the regression line and add the value of the y-intercept.
- c) divide the new predictor value by the slope of the correlation line and add the value of the y-intercept.
- d) add the new predictor value to the slope of the correlation line and divide by the value of the y-intercept.

3. For SAT scores to be a legitimate factor in determining college admissions,

- a) colleges must align their curriculum with the questions used on the SAT.
- b) SAT scores must be a direct (proximal) cause of success in college.
- c) SAT scores must be a cause (direct or indirect) of success in college.
- d) there must be a correlation between SAT scores and success in college.

4. The diagram to the right is an example of a

- a) histogram illustrating a lack of correlation between tobacco and alcohol.
- b) scatterplot illustrating a perfect correlation between tobacco and alcohol.
- c) scatterplot illustrating a positive correlation between tobacco and alcohol.
- d) histogram illustrating a positive correlation between tobacco and alcohol.



5. Which of the following choices best explains the concept of an “operational definition”?

- a) It supplies sufficient conditions for a variable.
- b) It provides necessary conditions for a variable.
- c) It provides necessary and sufficient conditions for a variable.
- d) It relates variables used in an hypothesis to measurable variables.

6. Using the number of items a person can recall has high construct validity as a measure of memory if it

- a) does not involve an operational definition of memory.
- b) is only employed in a limited range of settings.
- c) reliably assigns the same scores to the same individuals on different occasions.
- d) actually measures memory.

7. If the Pearson correlation between calories consumed and minutes spent texting is 0.04,

- a) the correlation is almost certainly not due to chance.
- b) calorie consumption is a good predictor of minutes spent texting.
- c) the correlation is very weak.
- d) the correlation has a high likelihood of being due to chance.

8. If all the points on a scatter plot lie on a straight line with positive slope

- a) the Pearson coefficient will be 0.5.
- b) the regression coefficient will be 1.0.
- c) 100% of the variance is explained by the correlation.
- d) one cannot tell what the Pearson coefficient will be.

9. You have found a correlation of .42 between two variables in a sample of people. Why do you need to determine whether the correlation is statistically significant?

- a) There could be a correlation in the sample but none in the actual population.
- b) There could be a correlation in the actual population but none in the sample.
- c) Although there is a correlation, it might not be very important.
- d) There may be very different reasons for the correlation in the actual population than in the sample.

10. Which of the following makes no sense?

- a)  $p < .10$
- b)  $r = .5$
- c)  $p = -.05$
- d)  $r = -.95$

11. If the regression line for the correlation between *hours of sleep* (S) and *memory score* (M) is  $M = -.72S + 16$ ,

- a)  $r = 16$
- b)  $r = -.72$
- c)  $r < 0$
- d)  $r = .49$

12. Statistical Significance can be employed to measure:

- a) the likelihood that a correlation you observed in a sample was due to chance.
- b) the likelihood of making a Type I error if one rejects the null hypothesis.
- c) the likelihood that a difference you observed in the mean values on a variable between two sample groups was due to chance.
- d) a & b
- e) a & c
- f) all of the above

13. Suppose that a study claimed  $p < .001$ . If the study concluded that the null hypothesis was false, its likelihood of being wrong

- a) cannot be determined from the information given.
- b) depends upon whether there was a proper control group.
- c) is greater than .999.
- d) is less than .001.

14. Jason won the sales competition in a local store in September and November. To explain why he didn't win in October, he should

- a) identify the intercept on the regression line.
- b) appeal to regression to the mean.
- c) note that streaks are highly unusual.
- d) calculate the Pearson coefficient.

15. The p-value reported in a correlational study corresponds to

- a) the probability of making Type II error.
- b) the slope of the regression line.
- c) the probability of getting your result when the null hypothesis is true.
- d) the probability that the null hypothesis is true, given your result.

16. In doing a test of statistical significance, you will have made a Type I error if you conclude that

- a) there is no difference between means in the population when in fact there is a difference.
- b) there is a difference between means in the population when in fact there is no difference.
- c) the absence of a difference in the samples is due to chance.
- d) any difference in the samples is due to chance.

17. If it is extremely important not to commit a Type I error in your study, you should

- a) require a high  $r$  value.
- b) require that  $p$  be  $< .01$  rather than  $< .05$ .
- c) require that  $p$  be  $< .1$  rather than  $< .05$ .
- d) conduct an experiment rather than a correlational study.

18. When would it be particularly important not to make a Type II error?

- a) When it is critical that you don't claim a difference when there isn't one.
- b) When Type I errors cannot be further reduced.
- c) When it is critical not to miss a difference when there is one.
- d) When finding a difference between means is extremely costly.

19. Which premise is required for an argument confirming a correlational claim to be valid

- a) If there is a correlation in the actual population, then the correlation in the sample will be statistically significant.
- b) If there is a correlation in the actual population, then the correlation in the sample will not be statistically significant.
- c) If there is not a correlation in the actual population, then the correlation in the sample will be statistically significant.
- d) If there is not a correlation in the actual population, then the correlation in the sample will not be statistically significant.

20. How could there be a large difference between the means of two sample populations and it still be wrong to conclude that there is a difference in the means of the two actual populations?

- a) There were errors in the measurement of the difference in the actual population.
- b) The difference between the sample populations was of the size that could not have arisen by chance.
- c) The difference between the sample populations was not statistically significant.
- d) The nominal variable in terms of which the sample population was divided was not operationally defined.

**B. Answer the following questions in a paragraph (20 points)**

1. Explain why establishing correlation does not suffice to demonstrate causation. What are some ways in which variables A and B may be correlated without A causing B?
2. Explain why, in a purely correlational study, one does not need to distinguish between independent and dependent variables.

**Part II: Causation**

**A. Indicate the *best* answer to each of the following multiple-choice questions (20 points)**

1. Which of the following is NOT a likely goal in moving from correlational studies to causal experiments?

- a) to understand why observed correlations hold
- b) to explore and understand ways of intervening in the world to bring about effects
- c) to falsify previously-accepted correlational hypotheses
- d) to explore and understand ways of intervening in the world to preclude effects from occurring

2. A \_\_\_\_\_ cause is a cause far back in a chain of causation

- a) proximate
- b) ultimate
- c) partial
- d) necessary

3. Which of the following is true of a necessary cause:

- a) If it fails to occur the effect will not occur.
- b) If it occurs then the effect will also occur.
- c) Every effect has only one necessary cause.
- d) If it fails to occur the effect might still occur.

4. Robbing a bank is

- a) a necessary cause of going to jail.
- b) a sufficient cause of going to jail.
- c) neither a necessary nor sufficient, but only a contributory cause of going to jail.
- d) both a necessary and a sufficient cause of going to jail.

5. You have read that owning a cell phone is a sufficient cause of getting dates. What would show you that this is incorrect?

- a) getting dates but not owning a cell phone
- b) not owning a cell phone and not getting dates
- c) owning a cell phone and not getting dates
- d) getting a fancy car and getting dates

6. Mill's methods allow us to:

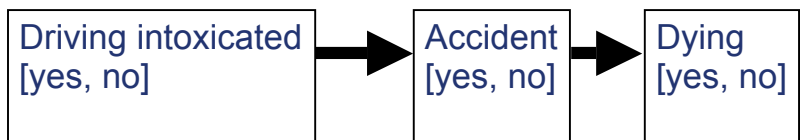
- a) identify actual effects from among possible effects.
- b) identify actual causes from among possible causes.
- c) avoid performing costly experiments.
- d) determine what variables are correlated with others.

7. In order to determine what caused some of her puppies to die and others to live, Ali decided to employ one of Mill's methods. She constructed the table to the right and from the results concluded it was leaving the puppies with her brother. Which of Mill's methods was Ali employing?

Had enough food	Had the proper shots	Stayed with her brother	Puppy died
Yes	No	Yes	Yes
No	Yes	Yes	Yes
Yes	No	No	No
Yes	No	No	No

- a) agreement
- b) difference
- c) residues
- d) concomitant variation

8. In the causal diagram to the right,



- a) driving intoxicated is a common cause of the accident and dying.
- b) the accident is a causal intermediate between driving intoxicated and dying.
- c) the accident is a common cause of driving intoxicated and dying.
- d) driving intoxicated is the proximate cause of dying.

9. You hypothesize that an observed association between heroin use (A) and AIDS (C) is due to the effects of a causal intermediary, the HIV virus (B). Assume that you can measure all three (A, B, and C) and can manipulate A and B. Which of the following would count as a test of your hypothesis that B is the causal intermediary?

- a) Block A and check whether A is still correlated with B.
- b) Block B and check whether B is still correlated with A.
- c) Block A and check whether B is still correlated with C.
- d) Block B and check whether A is still correlated with C.

10. What is the causal fallacy is exhibited in the following quotation: “Within weeks of Obama securing the Democratic nomination for President, major banks started to fail. Thus, Obama’s nomination must have caused them to fail”?
- irrelevant causal factors
  - ignoring a common cause
  - post hoc, ergo propter hoc
  - confusing cause and effect
11. If a researcher argued: “If gambling were not a cause of bankruptcy, then one would not expect a statistically significant difference in bankruptcy in states that allow gambling. The fact that there is such a difference shows gambling is a cause of bankruptcy.”
- She would be using denying the antecedent, which is invalid.
  - She would be confusing correlation and causation.
  - She would be using modus ponens, which is valid.
  - She would be using modus tollens, which is valid.
12. If there are differences in the way the subjects in the experimental and control group are treated, other than the manipulation of the independent variable being investigated, these are considered
- subject variable confounds.
  - procedural variable confounds.
  - dependent variable confounds.
  - independent variable confounds.
13. Confounding variables are a threat to the
- the logical validity of a study.
  - external validity of a study.
  - internal validity of a study.
  - statistical significance of the result.
14. Counterbalancing is used
- to increase the external validity of a study.
  - in within-subjects designs.
  - in between-subjects designs.
  - to eliminate the need of a posttest.
15. A pretest-posttest design is used
- when groups might differ at the outset on the dependent variable.
  - when groups might differ at the outset on the independent variable.
  - when it is not possible to manipulate the independent variable.
  - when counterbalancing is not possible.
16. Which of the following is a concern of external validity?
- The experimental and target groups are not relevantly similar.
  - Effects on the dependent variable are not due to the manipulation of the independent variable.
  - Effects on the independent variable are due to the manipulation of the dependent variable.
  - There was a confounding subject variable that was not adequately controlled.

17. Assume that in a laboratory study saccharin has been demonstrated to cause cancer in rats. Whether or not it causes cancer in humans is a question of:

- a) what the p-value of the correlation is.
- b) internal validity.
- c) external validity.
- d) the strength of the correlation.

18. A within-subjects experimental design

- a) eliminates any concern with procedural confounds.
- b) increases the risk of “carry-over” effects between conditions.
- c) increases the risk of “experimenter bias.”
- d) requires many more subjects than a between-subjects design.

19. When a researcher identifies possible subject confounds while doing a prospective study of differences due to shoe size, a good strategy is to

- a) randomize the assignment of subjects so as to break any correlation between them and the independent variable.
- b) screen off the confounds so that they do not influence the dependent variable.
- c) match subjects in the different groups in terms of possible confounding variables.
- d) lock the confounding variables so that they cannot affect the outcome.

20. Whenever on the morning of a game I put on my lucky socks, the Chargers win that afternoon. So I can make the Chargers win by putting on my lucky socks. This is an instance of

- a) the genetic fallacy.
- b) ignoring a common cause.
- c) post hoc, ergo propter hoc.
- d) confusing cause and effect.

### **B. Answer the following questions in a paragraph (20 points)**

1. Explain what is wrong with the following inference as a way to confirm a causal claim and present an alternative inference strategy that should be used to confirm the causal claim. Explain in clear prose how your alternative differs from the one below:

If watering my plants causes them to grow, then there will be a statistically significant difference in the resulting growth when I water some and don't water others. I watered some of my plants and not others and there was a statistically significant difference in their growth. So I conclude that watering my plants causes them to grow.

2. Many psychological studies performed in the U.S. use samples composed entirely of undergraduates in psychology classes. Discuss the implications of this in terms of the external validity of the experiments conducted. Under what circumstances will the experiments remain externally valid and when will external validity be compromised?

**Part III: Mechanism****A. Indicate the *best* answer to each of the following multiple-choice questions (10 points)**

1. To understand why giving a monkey treats whenever it presses a lever causes a monkey to press the lever more often, researchers should

- a) conduct experiments in which a group of monkeys is divided into two groups, one is provided with the reward and the other is not, and researchers check whether there is a statistically significant difference in subsequent lever pressing.
- b) conduct a naturalistic study to determine whether monkeys in natural circumstances tend to press levers when they are given food afterwards.
- c) search for an area inside the monkey's brain that is active whenever it is given a reward and attribute to it the full responsibility for increasing the frequency of lever pressing.
- d) search for operations in the monkey's brain which are involved as the monkey increases its response after receiving treats and determine how they are organized to produce the phenomenon.

2. Which is a necessary feature of a mechanism?

- a) negative feedback
- b) a designer
- c) causal loops
- d) working parts

3. Which of the following is not a necessary feature of a mechanism?

- a) a phenomenon
- b) component parts performing operations
- c) a designer
- d) organization

4. The ability of hydraulic systems to move statues in the Royal Garden provided a model for understanding animal behavior for Descartes because

- a) it suggested how a mechanism could produce behavior exhibited by animals, including humans.
- b) it showed how mechanisms could be used to provide entertainment.
- c) it suggested how a mechanism could account for thinking and language use.
- d) it showed that causal explanations were not needed to explain how animals behave.

5. Diagrams of mechanisms are particularly useful as ways of showing

- a) the names of the various components of a mechanism.
- b) how the various components of a mechanism are organized.
- c) the step by step process by which the parts should be put together.
- d) how to decompose a mechanism into its component operations.

6. The debate between holism and reductionism consist in all of the following except:

- a) holists claim that reductionists fail to consider the importance of higher-levels of organization.
- b) reductionists claim that holists fail to investigate the contributions parts make to the behavior of the whole.
- c) reductionists claim that we should reduce the number of components in a mechanism.
- d) holists claim that the whole is more than the sum of its parts.



7. In understanding a mechanism, it is important

- a) to focus all research at lower levels.
- b) to look both upwards to the context in which the mechanism operates and downwards to its parts.
- c) to run the mechanism in every conceivable condition to figure out how it functions under those conditions.
- d) to keep one's focus on the lower level parts and to conduct experiments to determine what these parts are doing.

8. Inhibition, as a method of investigating mechanisms, is so-named because it necessarily involves

- a) manipulating a negative cause.
- b) preventing the normal operation of some part of the mechanism.
- c) preventing the whole mechanism from receiving any input.
- d) preventing the whole mechanism from producing any output.

9. In inserting electrodes into a rat's hippocampus and recording as it navigates through a maze, a researcher is

- a) conducting a lesion study that shows that the hippocampus is necessary for spatial memory.
- b) conducting a stimulation study that shows that the hippocampus is sufficient for spatial memory.
- c) conducting a recording study that shows that activity in the hippocampus is sufficient for performing spatial memory tasks.
- d) conducting a recording study that shows that the hippocampus is active when the rat is performing spatial memory tasks.

10. A criticism reductionists make of holists is that

- a) they fail to consider how the mechanism as a whole is organized.
- b) they focus only on the parts not on what they do.
- c) they ignore the phenomenon that they are supposed to be trying to explain.
- d) they think that the parts and operations don't matter, only how they are organized.

**B. Answer the following question in a paragraph (10 points)**

1. Describe the different experimental procedures used to experiment on Gizmo and what each revealed about how that mechanism worked.