

You must turn in both this hard copy (with your name on it) and your scantron to receive credit for this exam.

One answer and only one answer per question. Leaving a question blank or filling in 2+ answers will be incorrect no matter what. Not every option for a set of questions need be used.

1-5. (10 pts). (Evidence of absence vs. absence of evidence) Which statements either:

- (A) Indicate that we have some evidence to support a conclusion or reject some models
 - (B) Can be interpreted as if we possibly do not have data
 - (C) Are scientifically impossible because the statement requires ruling out all alternatives. (If (C) & another option apply, use (C).)
 - (D) None of (A)-(C)
1. (A)(B)(C)(D) Horoscopes have no predictive power
 2. (A)(B)(C)(D) The probability of heads in a coin flip was estimated as lying between 0.46 and 0.55
 3. (A)(B)(C)(D) The cause of the outbreak is unknown.
 4. (A)(B)(C)(D) A vaccine provides 80% protection against the disease
 5. (A)(B)(C)(D) There's no evidence that GMOs are harmful to human health

Correlations, Causation & Hidden variables

6-9. (8 pts) Indicate which of the following statements describes a (non-zero) correlation, a zero correlation, data for which a correlation is undefined (one variable only), or describes causation but no correlation. If part of a group is described as having some attribute, assume that others in the group lack it.

A = a non-zero correlation, B = a zero correlation C = undefined (one variable) D = causation only

6. (A)(B)(C)(D) 98% of convicted felons eat bread
7. (A)(B)(C)(D) 30% of UT students have iPhones; 30% of Texas A&M students have iPhones
8. (A)(B)(C)(D) Drivers with lots of traffic tickets have higher insurance premiums than drivers with few tickets
9. (A)(B)(C)(D) Blood type A is found in 40% of Caucasians and 27.5% of Asians

10-13. (8pts) Recall the hypothetical table in which each cell gives the accident rate per 1000 cars of that type per year. Also remember that this table does not give the number of vehicles that occur in each cell.

		Type of car	
		sports	safe
Car color	red	5	3
	not red	10	6

Which of the following types of correlations could be obtained from this table? **(A) = COULD be obtained (B) = could not**

10. (A) (B) A correlation in which red cars have higher accident rates than non-red cars.
11. (A) (B) A correlation in which red cars have lower accident rates than other non-red cars.
12. (A) (B) A correlation in which sports cars have higher accident rates than 'safe' cars.
13. (A) (B) A correlation in which sports cars have lower accident rates than 'safe' cars.

14-18 (10 pts). Suppose that, across 10 major universities, students accepted into these universities have higher SAT scores than students declined admission. Which models are *consistent* with these data? This question is the same as asking which models cannot be rejected.

A = consistent, B = not

- 14. (A) (B) A high SAT score is used as a factor that increases the chance an applicant will be accepted into these 10 universities
- 15. (A) (B) A high SAT score is used as a factor that decreases the chance an applicant will be accepted into these 10 universities
- 16. (A) (B) SAT score is not used as a factor affecting an applicant's acceptance into these 10 universities
- 17. (A) (B) Students accepted into these universities have lower SAT scores than students declined admission
- 18. (A) (B) Acceptance rates at universities other than these 10 are not correlated with SAT scores.

19-22 (8 pts) Women that smoke when pregnant tend to have babies with low birth weight. Which of the following models invoke(s) a 3rd variable to explain the cause of this correlation?

A = 3rd variable invoked, B = no 3rd variable

Choose (A) if third variable invoked	Causal model
19. (A)(B)	Moms with poor health education tend to have poor diets and also tend to smoke during pregnancy. The poor diet during pregnancy provides less nutrients for the child, and lowers the birth weight.
20. (A)(B)	Cigarettes contain toxic chemicals that, when smoked by the mother, interact with the fetus and lower the birth weight of the child.
21. (A)(B)	Cigarette smoke causes the mother's lungs to become less functional and provide less oxygen to both herself and her child. The lack of oxygen causes the child's final birth weight to be lower.
22. (A)(B)	Mothers that live in poor neighborhoods are driven to smoke during pregnancy and are also afraid to go outside for exercise. Those living in affluent neighborhoods do not smoke and also get lots of outdoor exercise. The lack of exercise results in lower birth weight.

23-28. (12 pts) Which of the following options is indicated in 23-28? Base your answer only on the information provided.

- (A) correlation only -- merely describing one or more non-zero correlations,
- (B) correlation is used to infer/argue causation (i.e., a correlation leads people to infer the causal basis of the correlation)
- (C) causation is used to infer/argue correlation (both correlation and causation must go in the same direction)
- (D) correlation and causation go in opposite directions (Simpson's paradox)

- 23. (A)(B)(C)(D) Athletic teams whose uniforms are red have higher win rates than teams whose uniforms are not red. In the past (from times before an effect of red was suspected), teams changing their athletic colors to red experienced higher win rates.
- 24. (A)(B)(C)(D) Some drugs have been nicknamed 'gateway' drugs, which are considered less dangerous and more popular than 'hard' drugs. Data indicate that youth who use gateway drugs tend to graduate to use 'hard' drugs. This has led many to argue that the use of gateway drugs by youth leads them to hard drugs, and that if the gateway step could be blocked, the eventual use of hard drugs would also stop.
- 25. (A)(B)(C)(D) Studying improves a student's exam scores. Yet students who study more have lower exam scores than students who study less
- 26. (A)(B)(C)(D) Smoking causes lung cancer. Consequently, smokers have higher lung cancer rates than non-smokers.
- 27. (A)(B)(C)(D) People who overeat have high levels of health problems. People who smoke have high levels of health problems. People who both overeat and smoke have the highest levels of health problems.
- 28. (A)(B)(C)(D) *Coca cola* ads portray happy people drinking *Coca cola*. Viewers buy *Coca cola* to capture that happy feeling.

Controls and controlled variables

29-33. (10 pts) Mark all of the following statements about controls that are correct. In some options, you are asked to decide if a factor X is controlled. (A) = TRUE (B) = false

- 29. (A)(B) Controls are necessarily absent from correlational data because the data are gathered prior to any manipulation
- 30. (A)(B) A control group must be chosen randomly to qualify as a true control.
- 31. (A)(B) Factor X is controlled if X is present in the Control group and absent from the Treatment Group
- 32. (A)(B) Factor X is controlled if X is absent from every individual in both the Control and Treatment groups
- 33. (A)(B) Factor X is controlled if X is present in every individual in both the Control and Treatment groups

34-37. (8pts) David opens a post-graduate school that teaches skills and strategies for success in business. Admissions are limited to graduated college business majors who intend to start their own businesses. Unsure of what skills will work best for his clients, he randomly divides his first 200 clients into two groups, A and B. His teaching emphasis to group A is on establishing personal interactions with customers and making connections to established entrepreneurs. His emphasis to group B is on competence in marketing and finances. To measure success, David monitors how many of his former clients have their own successful business 5 years after completing his school.

Which factors/variables are controlled between groups A and B? (neglect the possibility of sampling error)

(A) is controlled, (B) is not controlled (C) is ambiguous as to whether it is controlled

- 34. (A)(B)(C) College major
- 35. (A)(B)(C) Gender
- 36. (A)(B)(C) The teaching emphasis
- 37. (A)(B)(C) University attended before enrolling in David's course

38-42. (10 pts) Jules is testing the effect of different bacterial probiotic combinations on chicken (bird) weight. He mixes different combinations of bacteria together and then feeds the mix to the bird along with chicken food. The different bacterial strains are denoted 1, 2, 3, 4, 5, and + indicates the bacterium is present in the mix, - is absent. He then finds out how much the birds weigh two weeks after being fed the mix; weight is given in the right-most column. Which statements in the following questions are true?

		bacterial strain					Weight
		1	2	3	4	5	
Mix	(A)	+	+	+	+	+	W_A
	(B)	+	+	+	+	-	W_B
	(C)	+	+	+	-	-	W_C
	(D)	+	+	-	-	-	W_D
	(E)	+	-	-	-	-	W_E
	(F)	-	-	-	-	-	W_F
	(G)	-	+	+	+	+	W_G
	(H)	-	-	+	+	+	W_H

A = TRUE, B = false

- 38. (A)(B) The weight of birds fed mixes with many + values in the row is expected to be higher than the weight of birds fed mixes with many - values.
- 39. (A) (B) Bird weight is expected to be the same between two mixes that control for all but one of the bacterial strains.
- 40. (A) (B) Any one of (B), (C), (D), or (E) can be compared with the row above it or with the row below it to control for all bacterial strains except one. (For example, (B) can be compared to (A) to control for all strains except one; (B) can also be compared with (C) to control for all strains except one.)
- 41. (A) (B) The pair (D) and (H) controls for NO bacterial strains.
- 42. (A) (B) The pair (G) and (H) controls for all bacterial strains except strain (2); the same is true for the pair (D) and (E).

Experiments

43-46 (8 pts). Which of the following studies describe experiments, regardless of whether the experiment was designed well or poorly and regardless of ethics. In each problem, the goal is given. The question is whether the option describes an experiment with respect to the goal. **(A) = is an experiment (B) is not**

- 43. (A)(B) You change the spark plugs in your car to see if the engine runs more smoothly.
- 44. (A)(B) You quit smoking with the hope that food tastes better.
- 45. (A)(B) A study is done to determine whether alcohol increases the incidence of birth defects. The study design involves comparing babies of women who voluntarily drank during pregnancy with those who did not.
- 46. (A)(B) A researcher records the diets of a large number of pregnant women. He finds that women who took twice the recommended daily dose of vitamin A have a 1 in 570 chance of a child with birth defects.

47-51. (10 pts) Prisoners of Silence video (FC = facilitated communication). *The video showed tests of FC suggesting that the facilitator, not the child, was the author of the typed responses.* The following questions require you to address and interpret the features of this experiment.

A = TRUE B = false

- 47. (A)(B) The experiment was designed specifically to discover if the descriptions of sexual abuse by a child were consistent and repeatable on separate occasions.
- 48. (A)(B) The critical feature of the design was to ask questions of the child whose answers were not known to the Facilitator.
- 49. (A)(B) The results obtained could not have been interpreted unless the objects shown to the child were known to the child in advance.
- 50. (A)(B) The study is considered an experiment specifically because it included a goal, controls, blind, and replication.
- 51. (A)(B) This experiment was the type in which the relevant 3rd variables were known in advance

52. (3 pts) (A) Key code, name, and ID number. Fill in **(A)** in scantron question 52 to indicate your key for this version of the exam.

Be sure your name and EID number are correctly bubbled in on the scantron.