

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. When you are given a list of options for a set of questions, some options may not be a correct answer for any of the questions.

**1-5. (8 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 have NO 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) There was a breach in protocol
  2. (A)(B)(C)(D) We cannot rule out a breach in protocol
  3. (A)(B)(C)(D) We have determined that the disease outbreak is not due to any kind of infectious cause.
  4. (A)(B)(C)(D) I am aware that there was cheating on the exam
  5. (A)(B)(C)(D) I cannot rule out that there was cheating on the exam

**Correlations, Causation & Hidden variables**

**6-9. (7 pts)** 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. There are now 4 different tables, and you are asked to indicate which tables could have a specific property.

Table		W	
		Type of car	
		risky	safe
Car color	red	5	2
	not red	10	4

X	
Type of car	
risky	safe
1	3
2	4

Y	
Type of car	
risky	safe
5	5
5	5

Z	
Type of car	
risky	safe
5	2
4	10

**For which tables** could there be a correlation in which risky cars have a higher accident rate than 'safe' cars?

(A) – the correlation is possible (B) the correlation is not possible

6. (A)(B) Table W
7. (A)(B) Table X
8. (A)(B) Table Y
9. (A)(B) Table Z

**10-13 (6 pts)** How many variables are indicated in each of the following descriptions?

(A) = 0                      (B) = 1                      (C) = 2                      (D) = 3

10. (A)(B)(C)(D) 95% of UT students eat red meat
11. (A)(B)(C)(D) All A&M students eat tortillas
12. (A)(B)(C)(D) The body weight for every UT student and the body weight for every A&M student
13. (A)(B)(C)(D) The body weight and eye color for every UT student

**14-18 (8 pts).** Across all US cities we observe that the more BBQ sold in the city, the higher the heart disease in the city. Which models are *consistent* with these data? This question is the same as asking which models cannot be rejected.

**A = consistent, thus cannot be rejected, B = not consistent – can be rejected**

- 14. (A) (B) Greater heart disease is caused by greater BBQ consumption
- 15. (A) (B) Lower heart disease is caused by greater BBQ consumption
- 16. (A) (B) BBQ consumption has no effect on heart disease
- 17. (A) (B) Cities with higher BBQ consumption have older populations than cities with low BBQ consumption, and age is the cause of heart disease.
- 18. (A) (B) Acceptance rates at universities are not affected by the SAT score of the student applicants. (*This option is not a mistake.*)

**19-22 (8 pts)** The GPA of students increases with the amount of time they spend studying. Which of the following models invoke(s) a 3<sup>rd</sup> variable to explain the cause of this correlation?

**A = 3<sup>rd</sup> variable invoked, B = no 3<sup>rd</sup> variable**

Choose (A) if third variable is invoked	Causal model
19. (A)(B)	Studying improves exam scores.
20. (A)(B)	Students who pay better attention in class also study more. Higher grades come from paying attention in class.
21. (A)(B)	The more a student drinks alcohol, the less time they study. Grades decrease from higher alcohol consumption.
22. (A)(B)	Studying causes a student to become interested in class. Interest level determines exam score.

**23-28. (10 pts)** Which of the following options is indicated? Base your answer only on the information provided.

- (A) no correlation is indicated.
- (B) correlation only – the statement merely describing one or more non-zero correlations,
- (C) correlation and causation are described but go in opposite directions (Simpson’s paradox)
- (D) correlation is used to infer/argue causation (i.e., a correlation leads people to infer the causal basis of the correlation)
- (E) causation is used to explain a correlation (both correlation and causation must go in the same direction)

- 23. (A)(B)(C)(D)(E) STD rates have gone up in years immediately following rises in beer taxes.
- 24. (A)(B)(C)(D)(E) A specific brand of fertilizer is applied to crops grown in regions that normally produce large plants even without fertilizer. The company advertises the large plants grown with their fertilizer. People who see the ad think the fertilizer is the reason for the large plants and buy the fertilizer to get large plants in their own gardens.
- 25. (A)(B)(C)(D)(E) Taking a voluntary driver education course improves one’s driving ability. Yet students who take the voluntary courses have higher accident rates than students who don’t take the course.
- 26. (A)(B)(C)(D)(E) Eating BBQ causes heart disease. Consequently, BBQ eaters have higher heart disease rates than do people who don’t eat BBQ.
- 27. (A)(B)(C)(D)(E) People who eat lots of sugar have high levels of tooth decay. People who avoid dental checkups have high levels of tooth decay. People who eat sugar and avoid dental checkups have the highest levels of tooth decay.
- 28. (A)(B)(C)(D)(E) Cigarette commercials portray happy people smoking a brand of cigarette. Viewers buy that brand to capture that happy feeling.

## Controls and controlled variables and Experiments

**29-38.** An uncle of yours markets a necklace made of special metals. He claims that wearing the necklace will lead to weight loss in overweight people. You consider experimental designs to test this claim. For each design below, you are asked about variables controlled and manipulated.

Which are true (A = TRUE, B = false)

**Design 1. (10 pts)** For 200 overweight male and female patients enrolled in a diet study, all are put on the same diet and told that the diet will enable them to lose 30 pounds. You have 100 of your uncle's necklaces and have 100 other necklaces that look similar but should not have any special powers. You randomly assign necklaces to your 200 patients and tell the patients that the necklaces are all the same and that they are only monitoring heart rate and oxygen level, even though the necklaces are not doing any monitoring. You compare weight change among the two groups after 2 months.

- 29 (A)(B) Design 1 controls for gender
- 30 (A)(B) Design 1 controls for body weight
- 31 (A)(B) Design 1 controls for type of necklace
- 32 (A)(B) Design 1 controls for patient expectation of weight change.
- 33 (A)(B) Design 1 manipulates patient expectation of weight change as a treatment variable.
- 34 (A)(B) Design 1 manipulates necklace type as a treatment variable.

**Design 2. (7 pts)** You enroll 200 overweight male and female patients in a study to lose weight. All are put on the same diet. You have 100 of your uncle's necklaces and have 100 others that look similar but do not have any supposed special powers. You randomly assign necklaces to your 200 patients and tell all patients that the necklaces should help them lose weight. You compare weight change between the two groups after 2 months.

- 35 (A)(B) Design 2 controls for type of necklace
- 36 (A)(B) Design 2 controls for patient expectation of weight change.
- 37 (A)(B) Design 2 manipulates patient expectation of weight change as a treatment variable.
- 38 (A)(B) Design 2 manipulates necklace type as a treatment variable.

**39-43. (9 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

- 39. (A)(B) The weight of birds fed mix (A) is expected to be higher than the weight of birds fed mix (D).
- 40. (A) (B) A comparison of birds fed mix (B) with those fed mix (C) controls for all bacterial strains.
- 41. (A) (B) A comparison of mix (E) with mix (F) controls for 4 of the 5 bacterial strains.
- 42. (A) (B) The average weight of birds fed one mix is always expected to differ from the average weight of bird fed a different mix.
- 43. (A) (B) No pair of comparisons allows you to assess the effect of mix 3 when all other mixes are controlled.

**44-48 (9 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**

44. (A)(B) You normally eat meat but you avoid meat for 6 months to see if your persistent gout (arthritis) gets better.
- 45 (A)(B) Yesterday, you got the idea that your periodic difficulty sleeping may stem from test anxiety. You recall from memory the nights over the last two months when you did not sleep well, and you compare those dates with dates of your exams during the same period. Poor sleep precedes exams by 2-4 days.
46. (A)(B) To your class, you give each student a personality description. By design and unknown to the class, each student gets the same personality description, even though you told the class that they were getting individualized descriptions. Your intent is to see if their expectations of an individualized description influences their evaluation of the description.
47. (A)(B) A researcher compares per capita chocolate consumption with the per capita rate of millionaires across different cities. To their surprise, the data show that the rate at which people are millionaires increases with chocolate consumption.
48. (A)(B) A psychic who makes predictions according to standard protocol chooses to start giving false predictions to see if it affects client responses.

**49-54. (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**

49. (A)(B) Experiment. An experiment was designed to test the effect of facilitator awareness of the answer.
50. (A)(B) Manipulation. The treatment consisted of showing the facilitator something different than what was shown to the child.
51. (A)(B) Controls. The controls consisted of using different facilitators with the same child.
52. (A)(B) Ideal data. The combined studies shown included replication of at least 5 types: multiple pictures, multiple types of tests, multiple facilitators, multiple children, and multiple institutions or locations.
53. (A)(B) The study is considered an experiment specifically because it included controls, blind, and replication.
54. (A)(B) This experiment was the type in which the relevant 3<sup>rd</sup> variables were known in advance

**55-57 (4pts)** In the bogus chocolate study (Quiz 11), which design features were clearly present?

**(A) = present (B) = absent or not clear**

- 55 (A)(B) Blind
- 56 (A)(B) Randomization
- 57 (A)(B) Replication

**58-61 (6pts)** In the bogus chocolate study (Quiz 11), which design features were considered to be present but unjustifiably weak?

**(A) = Present AND ALSO weak (B) Either completely absent or present but not weak**

- 58 (A)(B) Blind
- 59 (A)(B) Randomization
- 60 (A)(B) Replication
- 61 (A)(B) Standards

**62. (4 pts) (A) Key code, name, and ID number.** Fill in **(A)** in scantron question 62 to indicate your key for this version of the exam. Be sure your name and EID number are correctly bubbled in on the scantron.