A = True, B = False unless stated otherwise   name (required) _____

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.

Language of evaluation: falsifiability, irrelevant, consistent, support, null, ...

1-4 (6pts) Which types of data are <u>consistent</u> with a model? (A) = consistent with (B) = not

    1. (A) (B) Data that are inconclusive

    2. (A) (B) Data that are irrelevant to the model

    3. (A) (B) Data that support the model

    4. (A) (B) Data that refute the model

5-8 (6pts). Null models. Which are true? A = true B = false

    5. (A)(B) A null model is usually chosen because it has been supported in prior studies. Null models are generally not chosen without considering previous scientific tests.

    6. (A)(B). Examples of null models in use in the US include 'innocent until proven guilty' in criminal trials and 'safe until proven harmful' for herbal remedies.

    7. (A)(B) A null model is part of every properly designed study. A study lacking a null model is not properly designed.

    8. (A)(B) In a test of a null model such as that involving the probability of heads in a coin flip, ANY observable outcome is theoretically possible under the null model.

9-11 (4pts). Which statements either:

    (A) Indicate that we have some evidence to support a conclusion or reject some models

    (B) Indicate that we do not necessarily have data

    (C) Are impossible because the statement requires ruling out all alternatives. If this option applies, use it in place of (A) & (B)

    9. (A)(B(C) There are no aliens on earth

    10. (A)(B(C) We cannot rule out a breach in protocol

    11. (A)(B(C) There was a breach in protocol

Correlations, Causation & Hidden variables

12-15 (7 pts) Consider the following data and answer the questions about correlations.

              25% of UT students use Mac computers (the other 75% do not use Macs)

              30% of Texas A&M students use Mac computers (the other 70% do not use Macs)

A = true B = false

    12. (A)(B) The data can be interpreted as two variables measured on a single population of students

    13. (A)(B) The data can be interpreted as two variables measured on two populations of students

    14. (A)(B) The problem provides enough information to decide if a correlation is present.

    15. (A)(B) A positive correlation is indicated by the data.

16-21. (8 pts) Which of the following statements describes a (non-zero) correlation? Do not choose any option that describes a zero correlation, or for which a correlation is undefined, or which describes causation but no correlation. If insufficient information is given to determine whether a correlation exists, treat it as if there is no correlation. If part of a group is described as having some attribute, assume that others in the group do not have it. **A = is a (non-zero) correlation, B = not**

    16) (A)(B) 30% of UT students have iPhones (the others do not)

    17) (A)(B) 30% of UT students have iPhones (the others do not); of those with iPhones, 85% are right-handed, 15% are not

    18) (A)(B) Joe and Bonnie are big UT fans. They have special burnt orange shirts that they wear on UT game days and only on UT game days.

    19) (A)(B) Smoking causes lung cancer, thus smokers have higher lung cancer rates than non-smokers.

    20) (A)(B) Insurance companies raise premiums on drivers when the drivers get traffic tickets

    21) (A)(B) In the past 3 decades, STD rates have usually declined after taxes on beer were raised.

22-30. Recall the hypothetical table giving accident rate per car per year per 100,000 miles:

		Type of car	
		sports	safe
Car color	red	5	1
	other	10	2

22-25 (6pts). Which of the following are true? (A) = true (B) = false

    22. (A) (B) From this table, it is possible to obtain a correlation in which <u>red</u> cars have <u>higher</u> accident rates than other colored cars.

    23. (A) (B) From this table, it is possible to obtain a correlation in which <u>red</u> cars have <u>lower</u> accident rates than other colored cars.

    24. (A) (B) From this table, it is possible to obtain a correlation in which <u>sports</u> cars have <u>higher</u> accident rates than 'safe' cars.

    25. (A) (B) From this table, it is possible to obtain a correlation in which <u>sports</u> cars have <u>lower</u> accident rates than 'safe' cars.

26-30 (6pts). Suppose that cities with high car accident rates have higher proportions of red cars than cities with lower accident rates. Which models are *consistent* with these data? This question is the same as asking which models cannot be rejected.

    A = consistent, B = not

  26. (A) (B) Red causes a car to have a *lower* accident rate than other colors.

  27. (A) (B) A high proportion of red cars causes a city to have high accident rates

  28. (A) (B) A low proportion of red cars causes a city to have high accident rates

  29. (A) (B) Red has no effect on car accident rate.

  30. (A) (B) Cities with high proportions of trucks have a higher accident rate than cities with low proportions of trucks.

31-34 (8 pts) Background radiation rates are higher in houses made of stone than in wood houses. Which of the following models invokes a 3rd variable to explain the cause of this correlation between background radiation and construction material?

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

Choose (A) if third variable present	Causal model
31. (A)(B)	Stone houses are more common in parts of the country where rocks are available for construction. These parts of the country also have more radioactive elements in the soil. Radiation released from the soil is responsible for the background radiation in the houses.
32. (A)(B)	Stone has trace amounts of metal atoms that are radioactive. Stone thus releases more radiation than wood. Radiation released from stone is responsible for the higher background radiation in stone houses.
33. (A)(B)	For cultural reasons, stone houses were often built with basements, whereas wood houses usually lack basements. Radon – a radioactive gas – seeps from the ground into houses, and basements provide a much bigger input of radon than does a foundation that lies on top of the ground. Differences in radon levels due to the presence/absence of basements thus explains the difference in background radiation levels.
34. (A)(B)	The background radiation in houses comes from outer space. Wood blocks this radiation better than stone, so less radiation gets into the inside of houses if the house is made of wood than of stone.

35-39. **(8 pts)** Which of the following options is indicated in 35-39? Base your answer only on the information provided.

(A) infering causation from correlation (i.e., a correlation leads people to infer the causal basis of the correlation)
(B) merely describing a non-zero correlation,
(C) merely describing a zero correlation
(D) describing correlation from causation

35. (A)(B)(C)(D) A friend tells you that people eating a Mediterranean diet live longer than people eating other diets. Wishing to live long, you adopt a Mediterranean diet.

36 (A)(B)(C)(D) People who drink modest amounts of alcohol have higher survival rates than people who drink nothing and than people who drink excessively. As a consequence, the medical profession is now beginning to suggest that modest alcohol consumption is a way to enhance longevity.

37 (A)(B)(C)(D) Drinking alcohol impairs a person's coordination. As a consequence, drunk drivers are involved in auto accidents more often than are sober drivers.

38. (A)(B)(C)(D) UT students are just as likely to party on Friday night as on Saturday night

39. (A)(B)(C)(D) A person is more apt to make mistakes when they are sleepy than when they have had adequate sleep because the lack of sleep impairs judgment. As a consequence, sleepy drivers are involved in auto accidents more often than are awake drivers.

Controls and controlled variables

40-42. (**5 pts**) When investigating the possible cause of higher cancer rates in residents living near nuclear power plants (NPP) than in residents living far from the plant, which of the following would control for average level of smoking (a 3rd variable) as the cause of the observed cancer elevation? A = smoking controlled B = smoking not controlled

     40. (A)(B) Among residents living near NPP, compare cancer rates of smokers with those of non-smokers.

     41. (A)(B) Compare cancer rates of smokers living near NPP with cancer rates of non-smokers living away from NPP

     42. (A)(B) Compare cancer rates in a random group of residents living near the power plant with cancer rates in a random group of residents living away from the power plant.

43-47 A professor conducts an experiment with the incoming 2011 UT Freshman class (thousands of male and female students across all college disciplines and all majors) to determine the effect on grades of exposing them to different 'mindset' training exercises. Students are assigned randomly to either of two groups. One group watches a video emphasizing that intelligence can be developed ('growth mindset'). The other is exposed to a video emphasizing that intelligence is static ('fixed mindset'). Grades of the students from each group are compared at the end of the first year.

43-45 (5 pts) What variables are explicitly controlled for or expected to be controlled for within the individuals included in this experiment? Do not infer more than is given. A = controlled, B = not

     43. (A)(B) educational background of the student

     44. (A)(B) student age

     45. (A)(B) hair color

46,47 (**3 pts**) Each of the following two questions gives a feature that is variable in the population of all UT students. Which of those features would NOT be variable in the students participating in the study? A = not variable in the study B = variable in the study

     46. (A)(B) year of entry to UT

     47. (A)(B) class rank at the time of the study (Freshman, Sophomore, Junior, Senior)

48-52. (**8 pts**) Edis makes chocolate truffles of various flavors. She conducts an experiment to see which ingredients are most desired by her customers. She makes chocolates with different combinations of ingredients V, X, Y, Z and M (+ indicates the ingredient is present, - is absent). She then finds out how strongly people prefer the combination; preference level is given in the right-most column. Which statements in the following questions are true?

		factor					Preference
		V	X	Y	Z	M	
	(A)	+	+	+	+	+	P_A
Option	(B)	-	-	-	-	-	P_B
	(C)	+	-	+	+	+	P_C
	(D)	+	-	-	+	-	P_D
	(E)	+	-	-	-	-	P_E
	(F)	+	+	-	-	-	P_F
	(G)	-	+	-	-	+	P_G
	(H)	+	-	+	-	-	P_H

A = true, B = false

     48. (A)(B) Option A is the most strongly preferred combination of flavors because it has all + states.

     49. (A) (B) To know the effect of ingredient X on preference when all other ingredients are controlled, one could compare preferences for A&C.

     50. (A) (B) To know the effect of ingredient X on preference when all other ingredients are controlled, one cannot use the pair E&F, because many ingredients are absent in both E and F.

     51. (A) (B) Comparing preferences between A and B controls for all ingredients.

     52. (A)(B) Comparing preference levels for options G and H would indicate the effect of ingredient Z on preference.

Experiments

53-58. (**8 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.* Which of the following are true about that experiment?

53. (A)(B) Controls were the cases in which both the facilitator and child were shown the same object

54. (A)(B) The testing environment was formally laid out, the protocol was unambiguous and regimented; because of this strict protocol, we say the experiment was controlled.

55. (A)(B) Blind was an essential part of the experiment; blind is therefore the reason the study was considered an experiment

56. (A)(B) The experiments were specific tests of sexual abuse and were centered on the language and content in some of those descriptions of abuse.

57. (A)(B) This was the type of experiment in which 3rd variables were controlled by random assignment to treatment vs. control groups.

58. (A)(B) The source of the typing (child or facilitator) was less clear in some tests than others, and statistics were required to distinguish between the two models.

59-62. (**6pts**) Which options about the in-class personality survey and/or the horoscope test shown in the video are true?

59. (A)(B) Neither study was an experiment because there was no manipulation – everyone got the same personality description, so there was no way to manipulate.

60. (A)(B) A control group for the horoscope study (shown in the video) was ambiguous. Horoscopes done the usual way would have been one type of control.

61. (A)(B) The study shown in the video differed from our class exercise in that the personality descriptions used for our class gave many specific details about the personality.

62. (A)(B) The null model being tested in the video was that horoscopes provide at least some level of predictive power.

63-66. (**5 pts**) For the palm reading portion of the video, which design features were present AND are correctly explained by the option?

63. (A)(B) Controls were present: they were the readings done on the opposite hand (the left hand) from the usual reading.

64. (A)(B) No replication was apparent, because only one palm reader was shown.

65. (A)(B) These studies cannot be done blindly because the client knows their palm is being read; there is no way to get a response from the client unless they know their palm is being read.

66. (A)(B) For the palm reader, two thirds of his descriptions were wrong, but the other third were accurate.

67. (4 pts) (A) **Key code, name, and ID number**. Fill in (**A**) in scantron question 67 to indicate your key for this version of the exam.

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