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.

Italicized phrases and sentences should be considered true.

Intrinsic Difficulties

1-29. These questions ask for the intrinsic difficulty (difficulties) illustrated by the given statement. Do not assume any more than what is explicitly given in the question – address only the difficulties specifically mentioned. **A = described B = not described**

1-4. (3pts) Attributing health effects to diet in humans presents several challenges. First, for the types of experiments we can do with people, we must rely on the subjects' voluntary compliance and honesty in reporting the foods they consumed. Second, the effects of one food type in the diet (e.g, fat) depends on what else is in the diet, so there is no universally good food type. Third, the effect of a diet may not be manifested for more than a decade. Which difficulty/difficulties underlie these challenges?

1. (A)(B) Rare events

2. (A)(B) Time lags

3. (A)(B) Interactions

4. (A)(B) Humans make difficult subjects

5-8. (3pts) The FAA, which oversees airline safety, instituted a model of accidents (crashes) that uses data on near misses. Near misses are perhaps a poor model of crashes, but they are much more frequent than actual crashes. Airline safety has gotten to the point that there are not enough crashes to obtain adequate data on their causes. What difficulty explains why the FAA has resorted to this alternative model of crashes?

5. (A)(B) Rare events

6. (A)(B) Time lags

7. (A)(B) Interactions

8. (A)(B) Humans make difficult subjects

9-12. (3pts) People trying to get the best drug for their condition face two challenges. First, information they obtain about drug efficacy may be biased by company interests. Second, advice from their physician may be influenced by factors other than what is in their best interest. Which difficulty (difficulties) explain(s) why it is difficult for them to get the advice they need?

9. (A)(B) Rare events

10. (A)(B) Time lags

11. (A)(B) Interactions

12. (A)(B) Humans make difficult subjects

13-16. (3pts) Adding just nitrogen fertilizer to the soil causes a farmer's wheat to increase 4 inches in height. Adding just phosphate fertilizer causes them to increase 2 inches. Adding both nitrogen and phosphate fertilizer causes them to increase 4 inches. What kind of dfficulties underlie the relationship between increased height and type of fertilizer?

13. (A)(B) Rare events

14. (A)(B) Time lags

15. (A)(B) Interactions

16. (A)(B) Humans make difficult subjects

17-20. (3pts) Cooking is often considered an art. One of the major challenges is in creating unusual but appealing flavors because the contribution of an ingredient to a flavor depends on what other ingredients are included – one typically does not use garlic in desserts, or mustard on ice cream, for example. A flavor may thus require several ingredients and the omission (or inclusion) of even one can change it fundamentally. What difficulty/difficulties underlie this problem? **A = described B = not described**

17. (A)(B) Rare events

18. (A)(B) Time lags

19. (A)(B) Interactions

20. (A)(B) Humans make difficult subjects

21-24. (3pts) Which intrinsic difficulty is illustrated by the unwillingness of parents to accept the results from Facilitated Communication (FC) experiments (in the second part of the FC video)?

21. (A)(B) Rare events

22. (A)(B) Time lags

23. (A)(B) Interactions

24. (A)(B) Humans make difficult subjects

25-29. (5 pts) Which of the following are consequences or possible consequences of the rare events problem?

A= a (possible) consequence, B = not

25. (A)(B) The event may not occur even once in a sample.

26. (A)(B) The underlying rate may differ between two populations but the difference not be statistically detectable because the populations are not large enough

27. (A)(B) A clinical trial may fail to detect a side effect that will occur in hundreds of individuals when the drug is marketed

28. (A)(B) When rare events is a problem, the study lacks adequate controls.

29. (A)(B) A study subject to rare events necessarily has small sample sizes – typically100 or less and never more than 5,000.

Biological Determinism

30-34. (7pts) Which of the following are true about Biological Determinism, as covered in class? **A=true, B = false**

30. (A)(B) Eugenics in the U.S. was based heavily on and thus was borrowed from the Nazi eugenics views.

31. (A)(B) It was noted in class that biological determinism in the broad sense (that a person's behavior is not due entirely to their choice) has influenced some criminal penalties issued by U.S. courts in recent years.

32. (A)(B) The eugenics movement was motivated by the goal of building a better society through breeding of parents with desired properties.

33. (A)(B) The topic was relevant to 2 major class themes: (i) Humans make difficult subjects, and (ii) correlation does not imply causation

34. (A)(B) Current advances in the science of genomics has established that most of human behavior has a genetic basis.

35-38 (6pts) With respect to sexual preference in general, which are true? **A = true, B = false**

35. (A)(B) *The similarity of sexual preference between brothers is higher for identical twins than for full sibs*. This finding suggests a genetic basis to sexual preference, but the fact that identical twins do not always have the same sexual preference indicates that there are also non-genetic influences.

36. (A)(B) Some anatomical correlates of sexual preference were described. For two of these, we noted that the measurements virtually did not overlap –it was possible to assign sexual preference with 99% accuracy based on anatomy.

37. (A)(B) Some anatomical correlates of sexual preference suggested that gay males are overmasculinized.

38. (A)(B) Fraternal birth order is associated with the incidence of sexual preference. Fraternal birth order refers to the number older brothers sired by the same father.

Conflict

39-42. (6 pts). The money game. Which of the following options apply to the "money game" that used strips of paper?
A = true, B = false

39. (A)(B) The purpose of the game was to illustrate *bias* in the scientific method

40. (A)(B) In class, nearly all strips of paper had to be counted before the outcome of the game was clear.

41. (A)(B) Since this was an experiment, randomization was an important feature of the way the game should have been played. It was important to distribute the slips of paper randomly (or somewhat so), instead of letting people choose which slip of paper they got, to destroy unwanted correlations in the data.

42. (A)(B) Blind was an essential feature of the design, because the outcome would likely have changed profoundly if everyone in class had known what options were offered to others in the class.

43-46 (6 pts) Each of the following options describe a property of a vaccine, disease, or population. Indicate which of them works in favor of (allows or enables) a tragedy of the commons (ToC) conflict. **A = enables a ToC, B = does not**

43. (A)(B) Herd immunity exists for the disease

44. (A)(B) Individuals get vaccinated for selfish reasons

45. (A)(B) The infectious agent cannot spread from person to person

46. (A)(B) The vaccine does not prevent an individual from getting infected but does prevent transmission by the infected individual. Thus, the vaccine can create herd immunity.

47-50. (5 pts) The following was given in 2012 as a description that did not obey a tragedy of the commons (here modified slightly).

Six farmers form a cooperative to collectively manage their separate lands. During a long drought, it becomes necessary to irrigate. Collectively, they make a decision to pump water from the aquifer faster than it is replenished, and eventually, it runs dry. All six farmers suffer financially in future years because of the dry aquifer.

Which options explain why a tragedy of commons does not apply?

A = a reason that ToC does not apply B = wrong -- not a reason that ToC does not apply

47 (A)(B) There is no communal resource because the farmers own their separate lands.

48 (A)(B) Their selfish interests as individuals opposed the common good and caused the aquifer to collapse.

49 (A)(B) The collapse of the aquifer was due to a collective decision, not to the selfish interests opposing the common good.

50 (A)(B) The collapse of the aquifer involved a drought, which was not under the control of the owners.

51-54. (12 pts total) Which of the following explicitly describes a ToC conflict or outcome? **A =** a **ToC B = not ToC**

51. (A)(B) Three men together commit a robbery and quickly hide the money. They mutually agree to leave it buried for 10 years, until the threat of capture has diminished, at which time they will dig up the money and share it equally. They form an agreement that, in the event of capture, none of them will reveal the location of the money. All 3 go their separate ways, but one is captured and charged with the robbery. When presented with the option of reduced jail time, he tells the authorities where to find the money, and the money is recovered by the police.

52. (A)(B) Six people start a company – Quantice -- as an investment to make money. Their financial contributions to Quantice are equal. In 2 years a larger company offers to buy them out at 3 times the amount they invested. They collectively agree to the buyout and receive their money. The new owner shuts down Quantice because it was hurting profits of the larger company. As a consequence, the company they created is now gone.

53. (A)(B) Jerry Coyne buys a farm as an investment in agricultural land. He successfully raises crops for two years but decides that his profits are not high enough. So he institutes several practises to increase production, but those practices have the effect of causing soil erosion and the value of the land as well as the production declines. He ends up losing money on the investment.

54. (A)(B) 10 students each put $500 into an investment account, the profits of which are to be shared equally. The account is managed by a professional who is not one of the 10 students. Due to poor management and a tumultuous market, the account loses money, and each student recovers only $450 in the end.

55-59 (6 pts) To bias a scientific process by "controlling the null model" means which of the following? **A = true, B = false**

55. (A)(B) The experimental design is chosen to bias the outcome of the study.

56. (A)(B) The data analysis is conducted in such a way to bias the evaluation.

57. (A)(B) The model that is accepted until proven wrong is chosen by the individual according to his/her goals. This choice precedes the steps of experimental design and data analysis.

58. (A)(B) Treatment groups (as opposed to control groups) are chosen to favor one particular model.

59. (A)(B) "Controlling the null model" refers to a procedure in which the control group for the null model is chosen in a biased fashion, hence the word "controlling."

60-63 (5 pts) The video on Facilitated Communication (FC) part II illustrated several examples of bias. Which are true? *The FC administrator at Syracuse University was named Doug Biklen.* **A = true, B = false**

60. (A)(B) *Biklen raised objections to the tests of FC on the grounds that the testing environment was intimidating.* The controls used in the tests of FC (in which the facilitator and child were shown the same picture and the typing got the right answer) discredit his objection, but the video did not mention this point.

61. (A)(B) Bicklen claimed that no amount of failed tests (negative results) should be taken as grounds for rejecting FC. This is an example of 'refusal to admit that a model may be wrong.'

62. (A)(B) One or more of the psychologists interviewed claimed that emotional factors had led to their premature and uncritical acceptance of FC.

63. (A)(B) Several parents were unwilling to accept the evidence against FC. As evidence of their bias that we identified in class, some used anecdotes to support their belief in FC.

64-70. Use the following options (A)-(J) in questions **64-70**. An answer may be used once, never, or many times.

(A) character assassination of opponent	(D) build causation from correlation	(G) assay for a narrow spectrum of results	(J) None of A-I
(B) use 'either-or' arguments	(E) require refutation of all alternatives	(H) appeal to authority	
(C) make non-random assignments	(F) use anecdotes to defend a model	(I) Use small samples	

64-70 (3 pts each) In the questions below, match the example to the list above. Everything in the list pertains to bias (except J), but some are ways to bias a study and others are arguments/statements indicative of a person's bias.

64. In attempting to justify adding fluoride to the city's water, a politician argues that tooth decay rates are lower in cities with high fluoride in the water, so fluoride reduces tooth decay. What type of non-scientific argument is indicated in this argument?

(A) (B) (C) (D) (E) (F) (G) (H) (I) (J)

65. A student shown in the "Secrets of the Psychics" video (before exam 3) challenged the interpretation of the horoscope experiment on the grounds that the experiment did not "show there was nothing to" horoscopes. Which type of nonscientific argument underlies this challenge?

(A) (B) (C) (D) (E) (F) (G) (H) (I) (J)

66. Employment at Home Depot requires that the applicant pass a drug test. After reading the employment conditions, Ralph Wrench submitted to a drug test and filled out the application form. The test result was positive for at least one illegal substance, and he was therefore not hired. Which type of bias is indicated by this procedure?

(A) (B) (C) (D) (E) (F) (G) (H) (I) (J)

64-70 continued. Use (A)-(J) in questions **64-70.**

(A) character assassination of opponent	(D) build causation from correlation	(G) assay for a narrow spectrum of results	(J) None of A-I
(B) use 'either-or' arguments	(E) require refutation of all alternatives	(H) appeal to authority	
(C) make non-random assignments	(F) use anecdotes to defend a model	(I) Use small samples	

67. Lawyers, when questioning an expert for the opposing side in a court case, often look for minor weakness in the expert's arguments (if they can't find major ones). These weaknesses might be nothing more than the standard "errors" that underlie all data or the falsity inherent in all models. The lawyer then inflates the significance of these weaknesses and blows them out of proportion in an attempt to discredit the testimony. What type of non-scientific argument is indicated by this inflation of minor weaknesses?

(A) (B) (C) (D) (E) (F) (G) (H) (I) (J)

68. As Governor, Ann Richards publicly expressed her attitude that UT students were not poor and thus were not in dire need of money. She justified her position by commenting that some UT students drove expensive cars. If those students were not representative of UT students, nor of all the UT students she observed, which type of non-scientific argument is illustrated by her statement?

(A) (B) (C) (D) (E) (F) (G) (H) (I) (J)

69. In attempting to discredit the USDA's insistence on the use of pesticides, a lawyer argues that pesticides are not effective because pest levels are actually higher in agricultural fields sprayed with pesticides than in fields not sprayed with pesticides. What type of non-scientific argument is indicated in this argument?

(A) (B) (C) (D) (E) (F) (G) (H) (I) (J)

70. (Duane Gish, of the Creation Research Institute, engaged numerous biologists in public debates over the theory of evolution. One common method of argument he used was that the modern theory of evolution does not explain everything we see in living things. Since the theory of evolution is therefore inadequate, he argues that his alternative, Special Creation, must be correct.

(A) (B) (C) (D) (E) (F) (G) (H) (I) (J)

71. (4 pts) (A) Fill in **bubble A** on 71 to inducate your key. **Likewise make sure your name and EID are correctly bubbled in.**