1. (4 pts) Key code, EID , and name. Fill in (A B) to indicate your key for this version of the exam. Be sure your name and EID number are correctly bubbled in on the scantron and that you have put your name on this exam copy.

The money game

2. (5 pts) Which of the following are true about the demonstration involving money and conflict? MTF

A) The game was played so that everyone was given the same choice between a selfish option and an option that would have allowed everyone to benefit.

B) The point of the game requires several players; the demonstration could not have illustrated its point if the game was played with just one individual.

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

D) Winning money was based on an individual's ability to outwit others; if one was clever enough, he/she could win money regardless of the behavior of others.

E) The game illustrated how one can bias a study.

F) Randomization of the choices given to participants was critical to the outcome.

Brain 'Flaws'

3. (5pts) Lecture listed and explained several ways in which our brains are prone to mislead us (away from the scientific truth). Which of the following are true? The underlined portions indicate specific topics addressed. MTF

A) Repeated testing of a model beyond the first data set that supports it is an example of reinforcement.

B) Lotto advertisements that show actual winners but not the millions of losers was said to take advantage of our tendency to draw causation from correlation.

C) Refusal to admit error, appeal to authority, and optical illusions were all included in the list of ways our brains mislead us.

D) A major theme of this chapter is that humans deliberately/consciously act in ways that work against rational decision-making

E) Urban legends are transmitted despite their often implausibility because people respond to them emotionally rather than rationally.

Intrinsic Difficulties

4. (5pts) Which of the following options accurately explains one of the intrinsic difficulties and/or correctly explains why it constitutes a special difficulty for the scientific method? MTF

A) Intrinsic difficulties: These problems were said to arise mostly from inadequate controls or improper evaluation.

B) Rare events: this difficulty is a form of inadequate replication, that it is difficult to get a large enough sample to measure an effect accurately.

C) All models false: although we considered this topic earlier in the semester, we revisited this intrinsic difficulty along with the other new ones. It is an intrinsic difficulty because it makes the scientific method flawed.

D) Time lags: in a cause-effect relationship, the cause occurs long after the effect (outcome).

E) Rare events: a 'dispersed' event (not concentrated in time or space) was given in the book as one manifestation of a rare event.

F) Time lags: the effects of pollution on climate change was given as an illustration.

5-9. 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**. That is, address only the difficulties specifically mentioned. At least one answer per question.

(A)	(B)	(C)	(D)	(E)
Rare events are difficult to quantify	Time lags slow progress	Complexity (interactions)	Humans make difficult experimental subjects	None

5. (3pts) A test for adverse reactions to a vaccine finds none in its entire sample of the phase III clinical trial. Yet when released to the public, it is found to cause side effects for 1 in 30,000 patients. What 'difficulty' explains why this effect would have been missed in the trial?

(A) (B) (C) (D) (E) (at least one)

6. (3pts) When HIV/AIDS was first discovered, the epidemic was already well underway. The main reasons why we had difficulty in recognizing there was an infection going on were (i) that there was no known precedent for a virus that worked like HIV, and (ii) the virus did not manifest a health problem for the infected individual until about 10 years after they were infected, but a person could spread the virus within months after getting infected. Thus, there were many thousands of individuals infected before the first individuals developed problems. (A) (B) (C) (D) (E) (at least one)

7. (3pts). A researcher testing two different drugs (Primacon, Levicon) which were both developed to alleviate symptoms of ulcers finds no adverse effects when one or the other drug is given to 5,000 patients. However, after approval, the drug manufacturer that owns the rights to both drugs encourages patients to take both at the same time. When both drugs are taken, 10% of the patients develop adverse reactions. (A) (B) (C) (D) (E) (at least one)

8. (3pts) Understanding the effects of diet on human health poses many challenges, and we are not likely to resolve those any time soon. For the types of dietary experiments we can do with humans, we cannot be sure that the participants are complying with the protocol. Even for those patients that are compliant, there is the further issue of whether the health effect of a diet depends on a person's genotype and on the other items in their diet. And then we don't know how long a diet needs to be maintained to have a health effect – possibly a decade.

(A) (B) (C) (D) (E) (at least one)

9. (3pts) Sometimes scientists are simply unable to directly observe and measure what interests them. For example, before spacecraft became available, nobody knew what the back side of the moon looked like. And even today, scientists have no rock samples from deep inside the earth; the deepest bore-holes do not come anywhere near the center of the earth. In a similar vein, some standard medical diagnostic procedures are generally ineffective for very obese patients, because their fatty tissue simply obscures the doctor from observing what they need to see. Which intrinsic difficulty underlies these different examples?

(A) (B) (C) (D) (E) **(**at least one)

Tragedy of the Common (ToC)

10 (4pts) Each of the following options contrasts two properties of a vaccine, disease, or population. Mark those in which the *first* property (*italicized*) is more likely to result in a ToC conflict than the second property. MTF

A) *herd immunity is absent for the disease* / herd immunity exists

B) *individuals avoid vaccination for selfish reasons* / individuals get vaccinated for selfish reasons

C) *the infectious agent spreads from person to person* / the agent does not spread person-person

D) *the vaccine does not prevent an individual from getting infected but does prevent transmission from the infected individual* / the vaccine prevents the individual from getting infected

11 (8pts) Which of the following explicitly describes aToC conflict or outcome? MTF

A) Antibiotics are used to treat bacterial infections, but heavy use of antibiotics by a society leads to high levels of resistant bacteria, and antibiotics do not work against resistant bacteria. Thus if antibiotics are used minimally in a society, the drugs work for nearly everyone who takes them, and they can prevent many deaths from infection. Some countries sell antibiotics over the counter, others (like the U.S.) do not. Although people know that they should not use antibiotics unless necessary, individuals with easy access to antibiotics will take them for all sorts of reasons, on the chance that they might do the individual some good. As a consequence, counties with over-the-counter sales of antibiotics have high levels of antibiotic use and high levels of resistant bacteria, so the antibiotics are largely ineffective in those countries.

B) Ten professors purchase a company in which they all own equal shares. The goal of each is the same, to make money. These professors have different backgrounds – science, law, business – and thus have different management styles, and the company is set up so that they each have an equal say in management. Because of the differences of opinion, the company is never able to settle on a consistent management plan, and as a consequence, the company does not survive.

C) Twenty students of a large class (400) are told information about questions that will be part of an upcoming exam. The class grading is curved, so those 20 will benefit the most from this information if they keep it to themselves; if the entire class knows the information, it merely shifts the curve, and the twenty students would lose the benefit. However, for selfless reasons, each of those twenty students tells so many friends in the class about the questions that the advantage the 20 had at the beginning is now gone.

D) Ten countries join an economic union to gain economic clout in the global market; by contributing to a common currency, a collective economy gives each of the 10 counties a benefit over what they would get separately. However, the coordination of 10 countries is difficult, and although each country behaves according to the collective agreement, inefficiencies in the system are costly and destroy any benefit of the collective economy.

Other conflict and Bias

12 (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.* MTF

A) Much of the focus of this part of the video was the refusal of certain individuals to accept the results of the experiments debunking FC.

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 could have been used to discount his objection, but the video did not mention this point.

C) In one segment, Biklen argued that no amount of negative evidence (against FC) should be considered a basis for rejecting FC as valid communication.

D) New experiments shown in this second video raised questions about the first set of experiments.

13-22. (2 pts each) Bias can be introduced at several levels in a study, as given in A-C below. Which of those apply to the following questions? **You are also asked to distinguish ways of creating bias (A-C) from arguments/statements indicative of bias (D). One only for each question**

(A) Before the design and conduct	(B) In the design and conduct	(C) In evaluation and presentation	(D) Arguments indicative of bias	(E) None

13. Control the null model (A) (B) (C) (D) (E)

14. Choose a statistical analysis to support desired conclusion (A) (B) (C) (D) (E)

15. Assay for a narrow spectrum of unlikely results (A) (B) (C) (D) (E)

16. Choose an appropriate scale to display results favorably (A) (B) (C) (D) (E)

17. Use anecdotes to defend a model (A) (B) (C) (D) (E)

18. Build causation from correlation (A) (B) (C) (D) (E)

The following cases refer to abuses of the drug industry, as in the book or lecture:

19. Comparisons confounded by dose differences (A) (B) (C) (D) (E)

20. Test the wrong age group (A) (B) (C) (D) (E)

21. Using ghostwriters to put a good spin on the study (A) (B) (C) (D) (E)

22. Broaden the market (A) (B) (C) (D) (E)

Use the following options in questions 23-32.

A) character assassination of opponent
B) conceal true protocol
C) make non-random assignments
D) build causation from correlation
E) require refutation of all alternatives
F) use anecdotes to defend a model
G) assay for a narrow spectrum of results
H) appeal to authority
I) control the null model
J) use 'either-or' arguments

23-32 (2 pts each) In the questions below, match the example to the list above. Everything in the list pertains to bias, but some are ways to bias a study and others are arguments/statements indicative of a person's bias. The underlined part is that which must be matched to the list above. One or none for each question.

23. You are considering purchasing a car from its current owner. When you ask him about its miles per gallon (mpg), he recalls one time when it got 35 mpg, but he does not tell you the average. A B C D E F G H I J (one or none)

24. In explaining why he decided plan A was better than plan B for the city, a city councilman defends his choice by noting that the plan was the favorite of a well known local celebrity. A B C D E F G H I J (one or none)

25. A student paper argues that there is no evidence to support local beliefs in a ghost that haunts city hall. The professor criticizes the conclusion on the grounds that the evidence does not rule out some, perhaps small level of haunting. A B C D E F G H I J (one or none)

26. A defense lawyer attempts to discredit the scientific testimony of a prosecution witness by pointing out that the witness has done business in the past with an ex-convict. A B C D E F G H I J (one or none)

27. A scientist who has come up with a new theory for cancer argues that her theory must be correct because the previous one has been shown to be wrong. A B C D E F G H I J (one or none)

28. A company that suspects its product will cause reproductive dysfunction designs the phase III trial to look at cancer rates and cardiovascular health. A B C D E F G H I J (one or none)

29. A politician running for office claims that his opponent, the incumbent, was responsible for the economic downturn during the previous term. A B C D E F G H I J (one or none)

30. A company testing its drug writes the methods as double-blind but makes sure the patients are given subtle hints about how to tell the drug from the placebo. A B C D E F G H I J (one or none)

31. The Wikipedia page on Facilitated Communication discusses the controversy over whether FC represents valid communication from the autistic individual. One of the defenses of FC cited is that the tests have not shown that valid communication never occurs. Which of A-J is illustrated by this defense of FC? A B C D E F G H I J (one or none)

32. A lawyer in a suit against McDonald's argues that because people who eat at McDonald's are disproportionately in poor health, the food served by McDonald's is to blame. A B C D E F G H I J (one or none)

Biological Determinism (BD, for short)

33. (5pts) Sexual preference in humans: which are true? MTF

A) Several characteristics of men differ from those of women and also show correlations with sexual preference among men. For some of these characteristics, gay men are undermasculinized, for others, they are overmasculinized.

B) A correlation has been observed between male sexual preference and fraternal birth order.

C) A correlation has been observed between male sexual preference and finger length ratios.

D) Sexual preference in humans is different from sexual identity.

E) It was suggested that the new science of genomics will resolve many issues of biological determinism.

34. (5 pts) Besides sexual preference, in what contexts has the question of biological determinism been considered for or applied to humans (as listed in class)? MTF

A) IQ

B) Forced sterilization of people deemed of low intelligence or of other mental "inferiority"

C) Political orientation

D) Susceptibility to infectious diseases

E) Gender roles in society

F) Hair color

G) Eye color

35. (5 pts) With respect to the study by Simon LeVay, (MTF)

A) The topic was relevant to 2 major class themes: (i) Humans make difficult subjects, and (ii) time lags slow progress (because of the long time it takes HIV to kill a person)

B) In lecture, the anterior hypothalamus was shown to lie on the outside surface of the brain

C) The goal was to determine if gay vs. heterosexual males had detectable differences in brain anatomy

D) The result of the study was that no detectable differences were found between gay and heterosexual males for <u>most</u> of the brain anatomy regions studied (the "nuclei"), but a difference was found in one region.

E) It was known in advance that the anterior hypothalamus was a region involved in sexual preference based in part on studies of rodents.

F) The results from the LeVay study indicate both a correlational and causal basis to sexual preference.