35 questions, 3 pages.

Answer every question (1-35) with a single letter. If not specified otherwise, assume

A = True/yes   B =False/no

If any part of a question/option is wrong, treat the entire question as wrong.

Realms of Science (SM = scientific method)

1-5. (5 pts) Which of the following are valid possible uses of, conclusions or outcomes from the SM? Mark as false any option that lies outside the realm of science. These points were covered in class, and you should rely on those discussions.

(A) = True, (B) = False

1. **(A)(B)** No matter how many SM tests a model has survived, we never consider that model proven to be true.

2. **(A)(B)** Public attitudes on the validity of evolution as a science constitute data for deciding whether theories of evolution should be rejected.

3. **(A)(B)** Understanding how people develop their sense of ethics is a type of problem that lies outside the SM.

4. **(A)(B)** Rejecting a model that was retained/not rejected in a previous iteration of the SM means that the SM was incorrectly applied at some point in the process.

5. **(A)(B)** Proper use of the SM allows us to entertain (for testing) any falsifiable model, no matter how strange that model may seem. It is only after testing that we decide whether the model should be retained.

Scientific Method (SM)

6-8. (2pts) A company selling fertilizer X uses garden plots to test the two models:

(model i): plants grow better with fertilizer X than without X   compared to
(model ii): plants grow no better with fertilizer X than without X.

It fails to reject both models, meaning both are retained after the study. What are valid scientific conclusions from this study?

(A) a valid conclusion   (B) not a valid conclusion

6. **(A)(B)** Fertilizer X does not help plants grow better.

7. **(A)(B)** Fertilizer X does help plants grow better.

8. **(A)(B)** Fertilizer X possibly helps plants grow better.

9-13. (5 pts) Using shortcuts to identify improper SM. Each of the following options describes a process or behavior that might have a scientific basis (the goal is in parens). Indicate whether the option is plausibly consistent with proper use of the SM (option A) or instead appears to violate proper use of the SM (option B). The goal here is to identify suspicious practices that suggest a fundamental violation of normal use of SM.   Note that these descriptions do not allow you to assess all 5 elements of the S.M., so you must rely on what we called shortcuts. (Pay attention to what option A versus B represents.)

(A) is not suspicious – plausibly consistent with how SM is usually conducted

(B) is suspicious – plausibly, a fundamental violation of one or more elements of SM

9. **(A)(B)** A government (with the goal of public safety) continues to use a vaccine developed 50 years ago because the vaccine continues to be safe and effective.

10. **(A)(B)** A convenience store owner (with the goal of staying in business) keeps changing the snack food offerings to keep pace with consumer demand.

11. **(A)(B)** A student (with the goal of good grades) continues to use study methods that worked for him in high school, despite failing grades in college.

12. **(A)(B)** A goose hunter (with the goal of killing lots of geese) buys new styles of calls and decoys every year without finding out whether calls bought in the previous year work well or poorly. The hunter is convinced to buy new calls and decoys by listening to advertisements.

13. **(A)(B)** A yogurt company (wishing to maintain a large base of consumers) tries new advertising only when sales start to drop.

..

14-24. Identifying SM elements. Below are paragraphs, each giving a description of a process with possible parallels to the scientific method (SM). In the questions that follow each paragraph, you are asked to match a scientific method element with a quote taken from the paragraph. In each paragraph, the goal is underlined. Answers should be based only on what is explicitly described. (For an element to be present, there needs to be a reference to it existing; use None otherwise.)

Options (A)-(E) may be used once, more than once, or not at all. A model that constitutes a revision should use (E), but any revision should be scientifically based.

14-17. (4 pts) Joe starts a local business selling wood for wood stoves. He needs chain saws to cut the wood (plus other things, of course), but he does not know what brand performs best. He wants to minimize his time spent cutting wood, so he purchases four different models/brands of chain saws, designated W, X, Y and Z. Each saw is used for the same number of hours, and he records how much cutting is achieved during those hours (how much wood gets cut is due to a combination of saw power, blade length and hassles). Chains were sharpened or replaced as needed. At the end the season, he finds that the square footage cut per saw is as follows: 675 (W), 914 (X), 356 (Y), 475 (Z).

From his study, he concludes that brand X is the best for his goal, and that is the only brand he purchases for the next season.

(A) None   **(B)** Model   **(C)** Data   **(D)** Evaluation   **(E)** Revision

14. (A) (B) (C) (D) (E) 675 (W), 914 (X), 356 (Y), 475 (Z)

15. (A) (B) (C) (D) (E) four different brands/models of chain saws

16. (A) (B) (C) (D) (E) brand X is best for his goal

17. (A) (B) (C) (D) (E) starts a local business

18-21. (4 pts) Suzie's long term goal is to be a popular psychic. In college, she practices her methods on fellow students (free of charge), using their responses to inform her of what psychic methods will work for her. She tries palm reading, tarot card readings, astrology, aura reading, and numerology after having trained online to use the proper techniques. The responses of her fellow students to her efforts are noted and are to her satisfaction for all but aura reading and numerology, so she abandons those two and continues with the others.

(A) None   **(B)** Model   **(C)** Data   **(D)** Evaluation   **(E)** Revision

18. (A) (B) (C) (D) (E) abandons those two and continues with the others

19. (A) (B) (C) (D) (E) palm reading, tarot card readings, astrology, aura reading, and numerology

20. (A) (B) (C) (D) (E) The responses of fellow students are noted

21. (A) (B) (C) (D) (E) are to her satisfaction for all but aura reading and numerology

22-24 (3 pts). The Ford Foundation establishes a long term committee to distrubute money to help poor families. The committee is given a set of rules to follow in deciding who to help, and they follow those rules and spend all their money each year. The committee has the flexibility of changing those rules to better help poor families, but the committee never attempts to discover how well families are helped by their gifts.

(A) None   **(B)** Model   **(C)** Data   **(D)** Evaluation   **(E)** Revision

   22. (A)(B) set of rules to follow

   23. (A)(B) committee has the flexibility of changing those rules

   24. (A)(B) committee never attempts to discover

Deviations from rational behavior: fallacies, biases, and other problems with our reasoning

25-27 (3 pts) Which of the following statements are true? Use discussion from class. **(A) = True,   (B) = False**

25. (A)(B) Some `deviations' allow us to be easily influenced by others in ways that work against our own science-based reasoning.
26. (A)(B) Confirmation bias offers a viable alternative to the SM as a way of getting to the (scientific) truth – it is a bias that confirms what science would prove.
27. (A)(B) The deviations are only committed by 'scientifically illiterate' individuals. By knowing how science operates, one avoids the fallacies without having to worry about what they are or how they arise.

28-31 (4 pts) Which are either (i) ways that should reduce confirmation bias, or (ii) descriptions of someone who is taking steps to reduce confirmation bias?

(A) Reduces confirmation bias   (B) Would not reduce confirmation bias

28 (A)(B) Upon making an initial diagnosis of a patient's symptoms, Dr. Vincent Price then asks the patient questions that reinforce the initial diagnosis.
29 (A)(B) You ask someone for an independent evaluation of your analysis of the problem.
30 (A)(B) A prosecuting attorney typically tries to identify a 'prime' suspect based on preliminary evidence, then gathers additional evidence that specifically supports the guilt of that suspect.
31 (A)(B) You make decisions separately of others to avoid being socially influenced by them.

32-34 (3 pts) Which of the following represent conjunction fallacies?

(A) is a conjuction fallacy   (B) is not

32 (A)(B) A person thinks it more likely that a government conspiracy exists to cover up the presence of aliens than thinks it likely that aliens are present.
33 (A)(B) Upon hearing a description of an individual ('Linda'), a person concludes that it is more likely Linda is a bank teller and not a feminist than that Linda is a banker and a feminist.
34 (A)(B) A person responds differently to the same numerical data depending on the verbal context in which the data are described.

35. (1 pt) Provide your answer as B on #35 to indicate which version of exam you have.

Upload your answers to BbLearn in a Word or pdf file. Upload to the 'exam 1 upload answers' content area on BbLearn. Follow the format indicated there.