Cors 236 Exam 1 (2024) : 49 questions, 4 pages

Answer every question (1- 49) with a single letter. Put your answers on Canvas (Test 1_2024).

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.

SM = Scientific method; where applicable, goals are underlined

1-10. (10 pts) The use of evidence to evaluate a model is part of what we are calling the scientific method. Which of the following questions/problems fall within the realm of and could be addressed with evidence-based evaluation of models (or more generally, could be studied with the scientific method as we are using it in this class)?

> (A) Could be studied and lies within bounds of science.

> (B) Could not be studied as a science problem and/or lies outside the bounds of science

1. (A)(B) Does the Pythagorean theorem ($a^2 + b^2 = c^2$) give the exact lengths of sides of a right triangle?

2. (A)(B) What blood alcohol concentration leads to impaired driving?

3. (A)(B)   Is the earth flat?

4. (A)(B)   Does Bigfoot exist?

5. (A)(B) Can psychics predict winning lottery numbers?

6. (A)(B)   Does one advertising company create more monetarily successful ads than another?

7. (A)(B) Which of two budget models for a company gives the most accurate predictions?

8. (A)(B) Is the death penalty moral?

9. (A)(B) Does instituting the death penalty reduce the incidence of serious crimes?

10. (A)(B) Which of four soft drinks appeals to the most people?

11-14 (4 pts) A 2024 trial is done to determine whether a lotion reduces the severity of skin rashes. Assuming the trial is done correctly by scientific standards, what are possible outcomes (including outcomes from earlier work that was also done well)? Each option should be considered independently of others. In describing that a trial 'finds' an effect (a model), it means that the model is supported and the alternatives are rejected.

> **(A)** is a possible outcome if the trial is done right   **(B)** not a possible outcome

11. (A)(B) The 2024 trial finds that the lotion increases rash severity.

12. (A)(B) The 2024 trial finds that the lotion reduces rash severity.

13. (A)(B) The 2024 trial finds the opposite effect of a 2022 trial of the same lotion.

14. (A)(B) 2024 trial results are so inconclusive that it's possible the lotion could work at increasing or decreasing rash severity, but the study cannot say.

15-23 (9 pts) Which descriptions allow you to suspect a failure to adhere to proper scientific method (for the goal underlined)? If needed, rely on the 'shortcuts' given in class for some of the questions.

> **(A)** is suspicious -- likely not good SM   **(B)** not suspicious – very possibly consistent with SM

15. (A)(B) A new forensic method claiming to <u>match suspects to crime scene samples</u> has a very high success rate in experimental trials.

16. (A)(B) A snake handler <u>wishing to avoid being bitten</u> has never had a close call so does not change his methods of handling snakes.

17. (A)(B) An astrologer claims<u> to predict aspects of your future</u> without gathering data to see if those predictions are met.

18. (A)(B) A teacher wanting <u>to raise student interaction in the classroom </u> changes their attire often to see whether attire affects the interaction level.

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        (A) is suspicious -- likely not good SM   **(B)** not suspicious – very possibly consistent with SM

19. **(A)(B)** A student <u>wishing to do well in their courses</u> does not change their study mode despite failing tests.

20. **(A)(B)** A physician <u>wishing to cure a bacterial infection in a patient</u> changes the antibiotic (drug) when the infection does not resolve.

21. **(A)(B)** A duck hunter <u>wanting to shoot lots of ducks</u> keeps using the same decoy formation despite several hunts in a row that do not attract any ducks.

22. (A)(B) A group <u>trying to discredit evolutionary theory on scientific grounds</u> relies on public attitudes for disproving the theory.

23. (A)(B) A group developing a model to <u>predict the stock market</u> keeps changing the model, because the predictions are rarely accurate.

24-25 (2 pts). For these questions, we want to consider two different scientific problems (1, 2) as they would be addressed with the SM.

    <u>Problem 1</u>: We want to compare the model that plesiosaurs still exist somewhere in the ocean to the model that plesiosaurs are extinct.   (*plesiosaurs were marine reptiles that may now be extinct, but we are not completely sure*)

    <u>Problem 2</u>: We want to compare the model that a lotion resolves at least 80% of rashes in 48 hours to the model that the lotion resolves no more than 10% of rashes in 48 hours.

What can we say about how the SM can be applied to these two problems?   **(A)** True   **(B)** False

    (*For help in this problem, you may recall a discussion we had in class on applying the SM to the existence of Bigfoot versus whether the earth was flat or round.*)

24. **(A)(B)** Only one of these problems can legitimately be subjected to SM (to evidence-based evaluation of models)

25. **(A)(B)** The nature of tests is different for the two problems. We can propose no worldly evidence that might be used to reject the model that plesiosaurs exist somewhere on earth, but we can propose evidence that would allow us to reject either model in problem 2.

26-47. 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 either to match a scientific method element with a quote taken from the paragraph or asked something about SM elements. In each paragraph, the<u> goal is underlined</u>. Answers should be based only on what is explicitly described. Not all answers need be used for a paragraph, and some elements may be used more than once. <u>If a model is used as a Revision, choose Revision</u>. Using the goal given, you may find it easiest if you thread the description in the paragraph onto the scientific method template and then answer how the quoted phrases fit into the scientific method template. Some problems may not describe a fit to all scientific method elements – you need to figure this out. To qualify as a SM element, the quote need not describe all instances of that element in the paragraph.

26-28 (3 pts) Therapeutic Touch (TT) is a medical practice that is used (by nurses at some hospitals) <u>to help relieve a burn patient's pain.</u> It involves the nurse waving her hands over the afflicted part of the patient to detect and modify energy fields. The evidence from variety of tests of TT involving control and treatment groups is inconclusive in showing that TT performs as expected.

        (A) True   **(B)** False

26. **(A) (B)** In the context here, Therapeutic Touch is a model of pain relief

27. **(A) (B)** The fact that test results are inconclusive means that no data exist for TT.

28. **(A) (B)** The fact that test results are inconclusive means that TT has not been evaluated for its efficacy.

29-32 (4 pts) Holly is trying to <u>bake an acceptable loaf of gluten-free bread</u>. She first tries a recipe out of a book by Mary Jane Butters. But the resulting loaf is dense and not to her satisfaction. She then tries a recipe out of The Gluten Free Bible. The resulting loaf is wet and also not to her satisfaction.

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

29. (A) (B) (C) (D) (E)　　not to her satisfaction

30. (A) (B) (C) (D) (E)　　a recipe out of a book by Mary Jane Butters

31. (A) (B) (C) (D) (E)　　a recipe out of The Gluten Free Bible

32. (A) (B) (C) (D) (E)　　the resulting loaf is dense

33-35 (3 pts) You are starting an advertising company. Your first client wants you to <u>promote their plumbing business</u>. You develop two methods of advertising for them, one using Angie's list, the other using an email list you purchased.   You are able to tell whether a customer found out about the plumbing business through either of your ads or neither.   After two months, you find that Facebook generated 29 customers, the email list produced 13.

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

33. (A) (B) (C) (D) (E) one using Angie's list

34. (A) (B) (C) (D) (E) Your fist client

35. (A) (B) (C) (D) (E) 29 customers

36-39 (4 pts) During political campaigns, candidates attempt to <u>inspire people to vote for them</u>. A candidate has many possible ways and methods to inspire the voters, but they can use only one method on any specific audience. To determine the best method for their goal, they try different methods on different audiences and then measure the responses of each audience. The method that yields the highest voter response is the one considered to be the best and is then chosen to replace the others for future audiences.

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

36. (A) (B) (C) (D) (E) the responses of each audience

37. (A) (B) (C) (D) (E) is chosen to replace the others

38. (A) (B) (C) (D) (E) is the one considered to be the best

39. (A) (B) (C) (D) (E) ways and methods to inspire the voters

40-42 (3 pts) The boss of a residential cleaning service is trying to <u>expand her client base by ensuring and improving client satisfaction</u>. The service employs several individuals as cleaners, each sent to different addresses. The workers do the required cleaning, but client satisfaction is never assessed. The boss periodically fires randomly chosen employees because she suspects it keeps the others working harder.

(A) True　　　**(B)** False

40. (A) (B)　　Evaluation is indicated by the fact that the different cleaners are sent to different addresses.

41. (A) (B)　　Data appropriate for the goal are not described.

42. (A) (B)　　The fact that the boss periodically fires randomly chosen employees indicates that she is using a scientific basis for revision.

43-46 (4 pts) The government attempts to <u>predict the geographical paths of hurricanes</u>. It has an alphabetical set of names that are used for each tropical storm that develops during a year (all hurricanes start out as tropical storms). There is a different alphabetical list for each year, for 6 consecutive years, at which point the lists are reused in the same order. The names help the public keep track of the different storms and hurricanes.

Which of the following elements are described for the goal given?

(A) = present   **(B)** = absent

    43. (A) (B)   Model
    44. (A) (B)   Data
    45. (A) (B)   Evaluation
    46. (A) (B)   Revision

47 (1 pt) Joe Prine is hired by an accounting agency to<u> increase the productivity of employees.</u> He decides to do this by instigating fear, by firing the least productive workers to motivate the others to work harder. He measures the computer activity of each employee and fires the two with the lowest activity. A month later he measures computer activity of everyone again and finds that it is nearly the same as before. So he fires what are now the two least productive workers. A month later he measures computer activities again.

    Which statements are correct about revision in this description?   A statement must be correct about whether revision is absent/present (etc.) as well as correct about the reason.   **One answer only**

    (A) Revision is absent because Joe never changes his model of increasing worker productivity.

    (B) Revision is present because his first evaluation leads him to reject his model.

    (C) It is ambiguous whether revision is present, because the problem does not describe the actual data used.

48-49 (2pts). For each statement, indicate whether it is consistent with proper use and interpretation of the scientific method.

       (A) = Proper Use or True   (B) = not proper use, or False

48 (A)(B) Studies to test a model should be able to show that the model is right or wrong. If the study doesn't confirm that the model is either right or wrong, it has not been done correctly.

49 (A)(B) The SM has been mis-applied if none of the models being tested appear to fit the data. That is, as long as we entertain several models, we are assured that at least some of them are right.