Answer every question (1-46) with a single letter. Put your answers on Canvas (Test 1_2020).

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

1-6. (6 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) Is appropriate for SM study,   (B) Could not be studied or is inappropriate for scientific inquiry

1 (A)(B) Is the death penalty moral?

2 (A)(B) What is the exact, theoretical number of possible poker hands with 5 cards from a deck of 52 cards?

3 (A)(B) Can dog sniffing be used to identify perpetrators of crimes?

4 (A)(B) Is one management style better than another for maximizing worker productivity?

5 (A)(B) Are seasons due to the elliptical orbit of the sun?

6 (A)(B) Is it more probable that a hypothetical Linda is a bank teller than that she is a bank teller AND also a feminist?

7-11. (5 pts) Which statements are consistent with proper use and interpretation of the scientific method?

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

7 (A)(B) The scientific method is guaranteed of ultimately answering nearly any question to which it is applied, at least in the long run.

8 (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.

9 (A)(B) With most applications of the SM, we typically continue gathering more data even once the model has been subjected to a few tests without being rejected

10 (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.

11 (A)(B) A main point of this class is that the scientific method in its most general sense can be used to address many everyday problems that are not part of traditional science.

12-18. (7 pts) Which are correct statements about the scientific method elements?

(A) Correct   **(B)** Incorrect

12 (A)(B) In the U.S. criminal justice system, where the goal is to identify perpetrators of crimes, the granting of a new trial after a conviction (e.g., in response to new evidence) is a form of Revision.

13 (A)(B) A business that hopes to make money but has no business plan is therefore lacking in Data.

14 (A)(B) A student who hopes to graduate but makes no changes to his/her study method despite failing difficult classes is lacking at least in Models.

15 (A)(B) Evaluation involves comparing data to a model to determine if the model should be accepted or rejected

16 (A)(B) Revision is the choice of a new goal.

17 (A)(B) When the scientific method has led to an erroneous conclusion (e.g., rejected a model that should not have been rejected), the fault is necessarily bad data. For example, Evaluation is not a step where the process can go wrong.

18 (A)(B) Fallacies are errors in the SM that stem from bad Evaluation

19-22. (5pts) A clinical trial tests the effect of a new drug. Assuming the trial is done correctly by scientific standards, what are possible outcomes (and possibly from later work, also done well)? Each option should be considered independently of others.

(A) is a possible outcome if the trial is done right   **(B)** not a possible outcome – indicates an error

19. (A)(B) The trial finds a beneficial effect of the drug.

20. (A)(B) The study finds a detrimental effect of the drug.

21. (A)(B) Study results are so inconclusive that the drug might be harmful or might be beneficial, but the study cannot say.

22. (A)(B) A later trial finds the opposite effect of the drug from what the first trial reported.

23-31 (8 pts) Which descriptions allow you to suspect a failure to adhere to proper scientific method (for the goal, if underlined)? 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

23. (A)(B) A group tries to discredit the scientific Big Bang by using a negative public perception of the theory.

24. (A)(B) A group developing a model to predict weather keeps changing the model, because the predictions are rarely accurate.

25. (A)(B) A forensic scientist argues that the evidence (s)he presents in trials is scientifically valid based on the fact that the jury always returns a verdict agreeing with his/her testimony.

26. (A)(B) An advertising company wishing to market effective ads continually tests new versions of its ads on consumers to find out better ways to advertise.

27. (A)(B) A doctor wishes to claim that his acne-reduction cream is effective by gathering lots of evidence but reporting only supporting evidence

28. (A)(B) A politician wishing to maximize her voter support frequently changes her style of campaigning after measuring the public impact of each style.

29. (A)(B) Astrologers wanting to predict the future continue to use unchanging, centuries-old rules for generating predictive horoscopes with no evidence that the predictions are accurate.

30. (A)(B) A company marketing a dietary bacterial mix that is intended to improve health gathers no information on the health of its customers.

31. (A)(B) A farmer with the goal of high crop yields adopts new practices whenever the yields of the previous year are below the yields of neighboring farms.

32-46. 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 or asked something about SM elements. In each paragraph, the goal is underlined. 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. **Note: if a model is used as a revision in response to a previous test, choose Revision.**

32-35. (4 pts) Spring Valley is a local reservoir used for fishing. Idaho fish and game have made it a goal that <u>the reservoir have plenty of large bass for fishing</u>. To achieve this, they implemented a size limit in which no one is allowed to keep bass smaller than 16 inches long – any smaller bass that are caught must be returned to the water. After 5 years of imposing these size limits, a survey of bass sizes in the reservoir finds that large bass (longer than 16 inches) are still much rarer than they wish, but they don't know what to do about it.

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

32. (A) (B) (C) (D) (E)   are still much rarer than they wish

33. (A) (B) (C) (D) (E) a survey of bass sizes

34. (A) (B) (C) (D) (E)   a local reservoir used for fishing

35. (A) (B) (C) (D) (E) implemented a size limit

36-39 (4 pts) Holly wants to <u>find a suitable length of time to microwave appealing popcorn</u> – popping the most kernels without burning the popped ones. She tries a 2-minute trial and sees that many kernels remain unpopped, but there is no burning of popped ones. With those results not to her satisfaction, she then tries a 2 ½ minute trial. Again, there are many kernels that have not popped, and there is still no burning. Again, she thinks it is possible to do better, so she tries 3 minutes; with this trial, there is improvement in the number of kernels popped, but some of the popcorn has burned. She finds the burning undesirable, so she tries a trial for 2 ¾ minutes and is satisfied with the results.

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

36. (A) (B) (C) (D) (E)   many kernels remain unpopped, but there is no burning of popped ones.

37. (A) (B) (C) (D) (E)   a 2 minute trial

38. (A) (B) (C) (D) (E)   She finds the burning undesirable

39. (A) (B) (C) (D) (E)   a trial for 2 ¾ minutes

40-42. (3pts) In searching for <u>a method of improving student exam performance</u> that could be used by any US college student, researchers tested whether eating sugary foods the 10 hours before an exam leads to higher scores. They gave one group of Cors236 students sugar-coated donuts before exam 1 and another group of Cors236 students were given donuts without sugar before the same exam. Exam scores were as follows: students who consumed the sugary donuts had an average 10 points lower than the students who had donuts without sugar. The researchers concluded that consumption of sugary foods does not improve test performance for the average US student.

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

40. (A) (B) (C) (D) (E)   eating sugary foods the 10 hours before an exam leads to higher scores

41. (A) (B) (C) (D) (E) Exam scores

42. (A) (B) (C) (D) (E)   consumption of sugary foods does not improve test performance

43-46 (4 pts) You are looking for a <u>way to maximize your tax returns</u>. In the past, you have done taxes yourself, but you question your knowledge of tax breaks. So you hire an accountant to calculate your 2021 taxes to see if they would do a better job than you. At the same time, you secretly calculate your 2021 taxes the way you would normally do. By your calculations, you will get a return of $1300. You await the accountant's calculations. (A)= True, (B) = False

43. (A)(B) Doing your own tax calculations constitutes a Model for your goal

44. (A)(B) The accountant doing your tax calculations constitutes a Model for your goal

45. (A)(B) The problem does not describe an Evaluation

46. (A)(B) The problem does not provide any Data that would be used to evaluate your goal.

A backup: In addition to inputting your answers to Canvas Test 1_2022, you may upload your answers to Canvas in a separate Word or pdf file as a backup. You upload this to **Test 1 upload file of answers.**