Cors 236 Exam 4 (2022) : 49 questions, 6 pages
Answer every question (1-49) with a single letter. Put your answers on Canvas (Test 4_2022).

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.
Where applicable, goals are underlined. Consider *italicized phrases to be true.*

Forensics

1-4 (4 pts) The following is a list of forensic matching methods used for decades (not necessarily into the present). Which methods experienced error rates of 10% or more in proficiency tests or failed to satisfy at least 2 of the properties of 'ideal forensics?'
            (A) = True (experienced high error rates, etc)   (B) = False (did not experience those problems)

> **1. (A)(B)** Fingerprint matching (before 1990)

> **2. (A)(B)** Hair matching (non-DNA)

> **3. (A)(B)** Dog sniffing

> **4. (A)(B)** Bite marks

5-9 (5pts). In the following, a property of a forensic method, underlined, is described as absent or what it might consist of. The text following the underline gives a possible example of what the underlined text describes. Indicate whether the underline is a valid/ true match for the non-underlined text. (A) = True   (B) = False

5. (A)(B) discrete characteristics are used: applies when a match is based on properties of the sample that are permanent – unchanging in time (such as trace metals in bullet lead analysis).

6. (A)(B) A possible reference database for matching hair samples would be: a description of the characteristics and methods used to score hair properties.

7. (A)(B) A proficiency test is absent: a dog sniffing expert whose ability to track a person has never been checked by comparing a person's known path (directly observed) to the expert's claims of what the path was.

8. (A)(B) A fully blind analysis is satisfied: samples are sent to a lab for analysis; the tubes are labeled with names of suspect, victim, and crime sample, but no one in the lab personally knows any of the people involved.

9. (A)(B) Independent verification of a method used for analysis is present: when the lab can pass a proficiency test.

10-13 (4 pts). In the following paragraph, which features of 'ideal forensics' are indicated?'

A forensic method matches bite marks found on a body with the suspect's teeth. Bite marks on the corpse are measured by the depths of indentations and distances between them, matched to the sizes of cusps of the suspect's teeth and distances between them; these are quantitative measurements, not all-or-none. Only some types of bites are complete enough for the method. Matching is based on an expert's opinion, not a formal procedure, of the similarity between teeth and bite mark. The chance of a random/coincidental match is based on the expert's recollection of whether teeth from other cases would have produced a similar bite impression as observed in the present case.

            A = indicated as present   B= absent, incomplete or not used

> **10.** (A) (B) reference database that can be screened for a RMP

> **11.** (A) (B) discrete characteristics

> **12.** (A) (B) people conducting the test have passed blind proficiency tests

> **13.** (A) (B) Independent verification (explicitly present or the means for doing it is described)

14-16 (3 pts) Two eyewitness videos were shown in class, one in which the class chose an individual from a lineup. Which of the following is/are true as pertains to the purpose or content or outcome of those videos? **A = true B = false**

14. (A)(B) One video showed how the order of suspects in a line-up matter – that you are likely to choose someone in the middle.

15. (A)(B) Both demos showed that eyewitness ID is unreliable, with 50% or more of the audience identifying the wrong person. Furthermore, the mistaken identifications were spread across different innocent people, rather than focused on one.

16. (A)(B) One of the points made in lecture, based on results from previous years, was that the instructions given before the lineup influence the rate of erroneous identification.

17 (2 pts) You are on a jury in a criminal case. A match is declared between a sample and suspect, with a claimed random match probability of 1/million. You are also told the lab has made erroneous matches 1% of the time (human and technical error of 1 in 100 cases). You must decide how to reconcile the two numbers

Among the following options, which is closest to the chance that the stated match is not real? - that the source of the sample is not the suspect? LER is lab error rate (1% =1/100 for this problem). RMP is the random match probability, or chance of a coincidental match.

(A) the RMP (= 1/million)

(B) the LER (= 1/100)

(C) the LER + RMP (= 1/million + 1/100)

(D) the LER multiplied by the RMP (= 1/million x 1/100)

(E) You cannot do the calculation if there is a chance of human and technical error

Language of Evaluation

18-21 (4pts) Indicate which of the following statements are considered <u>strong</u> versus <u>weak</u> as to whether evidence is required before they can legitimately be made.

(A) Strong (requires data)   (B) Weak (can be made without data)

18. (A)(B) Horoscopes have no predictive power

19. (A)(B) The source of the outbreak is unknown

20. (A)(B) There is no evidence that GMOs are harmful to your health

21. (A)(B) Masks are not effective at protecting against the virus

22-24 (3pts). A study is done showing that cats fed dry food have a higher incidence of bladder cancer than cats fed other food. A statistical test shows that a difference of this magnitude would happen 1 in 10 times if there was in fact no effect of eating dry food.

What would be the typical scientific conclusion from this study? **(A) = True** (B) = False

      22. (A)(B) We would reject the hypothesis that there is no effect of eating dry food

      23. (A)(B) We would not reject (and thus retain) the hypothesis that there is no effect of eating dry food.

      24. (A)(B) We would conclude that there is no evidence of an effect of eating dry food.

25-29 (5pts) . A study is done showing that cats fed dry food have a higher incidence of bladder cancer than cats fed other food. A statistical test shows that a difference of this magnitude would happen 1 in 40 times if there was in fact no effect of eating dry food.

What is would be the typical scientific conclusion from this study? A = TRUE

25. (A)(B) We would reject the hypothesis that there is no effect of eating dry food

26. (A)(B) We would not reject (and thus retain) the hypothesis that there is no effect of eating dry food.

27. (A)(B) We would conclude that there is no effect of eating dry food.

28. (A)(B) We would conclude that there is an effect of eating dry food.

29. (A)(B) We would conclude that there is no evidence of an effect of eating dry food.

30-31 (2 pts). A study is done showing that cats fed dry food have a higher incidence of bladder cancer than cats fed other food. A statistical test shows that a difference of this magnitude would happen 1 in 100 times if there was in fact no effect of eating dry food.

What would be the broad sense evaluation from this study if it was the only study of its type? (A) = True (B) = False

30. (A)(B) This study alone would be enough to justify widespread, social advocacy against feeding dry food to cats.

31. (A)(B) More studies would need to be done, with similar results, before warranting widespread acceptance of the result.

32-33. (2 pts) A model is rejected because the data would be observed less than 1% of the time if the model was true. Which apply? (A) = True (B) = False

32. (A)(B) We decide that the model cannot ever be true.

33. (A)(B) We recognize that there will be occasions when the model is true yet we just happened to get extreme results.

Correlation, causation

34-38. (5 pts) How many variables are described in the following problems? (If there are 2 or more populations/groups, consider that to represent one variable.) Body weight can be assumed to differ among students.

34. (A)(B) 95% of UI Freshmen eat red meat; 96% of UI sophomores eat red meat

(A) 0   (B) 1   (C) 2   (D) 3

35. (A)(B) The body weight of every UI student

(A) 0   (B) 1   (C) 2   (D) 3

36. (A)(B) The body weight for every UI student and the body weight for every BSU student

(A) 0   (B) 1   (C) 2   (D) 3

37. (A)(B) The body weight and eye color for every UI student (not all the same)

(A) 0   (B) 1   (C) 2   (D) 3

38. (A)(B) All UI students eat tortillas

(A) 0   (B) 1   (C) 2   (D) 3

39 (1 pt) We observe a correlation between accident rate and car color: red cars have higher accident rates. For the causal model

'risky drivers prefer red'

to explain this correlation, what is the causal variable?

(A) Color   (B) type of car   (C) type of driver   (D) age of car   (E) None

40-45. **(6 pts)** Which of the following options is indicated? Base your answer only on the information provided.

(A) no correlation is indicated.

(B) correlation only – the statement merely describing one or more non-zero correlations

(C) causation only – the statement describes a causal model and no correlation is described

(D) correlation and causation are both described. Choose this option if the description is of people inferring causation from correlation

40. (A)(B)(C)(D) STD rates have increased in years immediately following rises In beer taxes.

41 (A)(B)(C)(D) A specific brand of fertilizer is applied to crops grown in regions that normally produce large plants with or without fertilizer. The company advertises the large plants grown with their fertilizer. People who see the ad think the fertilizer is the reason for the large plants and buy the fertilizer to get large plants in their own gardens.

42 (A)(B)(C)(D) Taking a voluntary driver education course improves one's driving ability. Yet students who take the voluntary courses have higher accident rates than students who don't take the course.

43. (A)(B)(C)(D) People who eat lots of sugar have high levels of tooth decay. People who avoid dental checkups have high levels of tooth decay. People who eat sugar and avoid dental checkups have the highest levels of tooth decay.

44 (A)(B)(C)(D) Some drugs have been nicknamed 'gateway' drugs, which are considered less dangerous and more popular than 'hard' drugs. Data indicate that youth who use gateway drugs also tend to use 'hard' drugs. This has led many to argue that the use of gateway drugs by youth leads them to move to hard drugs, and that if the gateway step could be blocked, the eventual use of hard drugs would also stop.

45. (A)(B)(C)(D)   Smoking causes lung cancer. Consequently, smokers have higher lung cancer rates than non-smokers.

Third variables

46-49 (4 pts) Women that smoke when pregnant tend to have babies with low birth weight. Which of the following models invoke(s) a 3rd variable to explain the cause of this correlation between smoking and birth weight? Use the method given in class to decide when a 3rd variable is invoked.

A = 3rd variable invoked, B = no 3rd variable

Choose (A) if third variable invoked	Causal model
46. (A)(B)	Moms with poor health education tend to have poor diets and also tend to smoke during pregnancy. The poor diet during pregnancy provides less nutrients for the child, and lowers the birth weight.
47. (A)(B)	Cigarettes contain toxic chemicals that, when smoked by the mother, interact with the fetus and lower the birth weight of the child.
48. (A)(B)	Cigarette smoke causes the mother's lungs to become less functional and provide less oxygen to both herself and her child. The lack of oxygen causes the child's final birth weight to be lower.
49. (A)(B)	Mothers that live in poor neighborhoods are driven to smoke during pregnancy and are also afraid to go outside for exercise. Those living in affluent neighborhoods do not smoke and also get lots of outdoor exercise. The lack of exercise results in lower birth weight.

A backup: In addition to inputting your answers to Canvas Test 4_2022, you may upload your answers to Canvas in a separate Word or pdf file as a backup. You upload this to **Test 4 upload file of answers.**