DIRECTIONS

- Exam format is multiple choice. Choose the single best answer for each question. Answers and a formula sheet are found at back.

- **Disclaimer:** These practice questions are intended to familiarize you with the *style* of the exam. The content of actual exam questions will differ. **Practice questions don't replace homework; they only *add value* to your previous homework preparation.**

Questions 1–6.
Scientists at the U.S. Forest Service would like to estimate the mean weight of all "catchable trout" fish which live in the Snake River. An individual trout fish is classified as "catchable" if it weighs more than one pound.

The term "catchable" refers to the fact that users of a trout fishing license on the Snake River are required to return to the river any trout fish they catch that weighs one pound or less. The fish may be kept if it weighs more than one pound.

The scientists collected a group of 12 trout fish from the Snake River by use of a net. Each of the fish was then weighed and returned to the river unharmed. The weights of the 12 fish, in pounds, are

1.3 0.5 3.2 4.7 0.8 2.2 5.1 1.1 0.9 0.8 3.3 0.8

Apply the **Six Steps of Inference** to this problem.

1. What's the *question*?

   (a) What is the average weight of all trout fish that live in the Snake River?
   (b) What is the mean weight of all trout fish that live in the Snake River and whose weight is one pound or less?
   (c) What is the mean temperature of the Snake River during the month of July?
   (d) Of all trout fish that live in the Snake River, what percentage weigh more than one pound?
   (e) What is the average weight of all trout fish that live in the Snake River and weigh more than one pound?

2. What's the *population*?

   (a) All trout fish that live in the Snake River and weigh more than one pound.
   (b) The 12 trout fish that were caught by scientists at the U.S. Forest Service.
   (c) All trout fish that live in the Snake River.
   (d) All trout fish that live in the Snake River and weigh one pound or less.
   (e) The 7 trout fish that were caught by scientists at the U.S. Forest Service and weigh more than one pound.

3. What's the *sample*?

   (a) The 7 trout fish that were caught by scientists at the U.S. Forest Service and weigh more than one pound.

   (b) All trout fish that live in the Snake River and weigh one pound or less.

   (c) The 12 trout fish that were caught by scientists at the U.S. Forest Service.

   (d) The 5 trout fish that were caught by scientists at the U.S. Forest Service and weigh at most one pound.

   (e) All trout fish that live in the Snake River and weigh more than one pound.

4. What *variable* is measured on each object in the sample?

   (a) Average weight measured in pounds.

   (b) A "Yes" or "No" answer to whether an individual trout fish weighs more than one pound.

   (c) Weight measured in pounds.

   (d) The percentage of all trout fish that live in the Snake River and weigh more than one pound.

   (e) A "Yes" or "No" answer to whether an individual trout fish living in the Snake River is caught in the net used by scientists at the U.S. Forest Service.

5. What's the *summary* of the sample data?

   (a) The average weight of the 12 fish in the sample is 2.058 pounds (rounded to 3 decimal places.)

   (b) 58.3% of the 12 fish in the sample weigh more than one pound.

   (c) The average weight of the 7 fish in the sample is 2.986 pounds (rounded to 3 decimal places.)

   (d) The average weight of the 5 fish in the sample is 0.76 pounds.

   (e) The average weight of all trout fish that live in the Snake River and weigh more than one pound is approximately 2.986 pounds.

6. What's the *inference*?

   (a) Approximately 58.3% of all trout fish that live in the Snake River also weigh more than one pound.

   (b) The average weight of the 7 fish in the sample is 2.986 pounds (rounded to 3 decimal places.)

   (c) The average weight of the 12 fish in the sample is 2.058 pounds (rounded to 3 decimal places.)

   (d) The average weight of all trout fish that live in the Snake River and weigh more than one pound is approximately 2.986 pounds.

   (e) The average weight of all trout fish that live in the Snake River is approximately 2.986 pounds.

Question 7.

The U.S. Department of Highway Administration is threatening to withhold $25 million in highway funds previously allocated to the Iowa Department of Transportation because it claims that more than 60% of all vehicles traveling on a 10-mile stretch of Interstate 80 in Iowa violate the posted speed limit of 65 miles per hour (mph.)

A random sample of 83 vehicles traveling on this stretch of highway is summarized below.

Speed (mph)	**Frequency**
Below 40	0
40 – 49.9	1
50 – 59.9	6
60 – 69.9	18
70 – 79.9	37
80 – 89.9	17
90 or more	4
	83

7. Is the claim supported by the sample data?

   (a) No, since at least 69.9% of vehicles in the sample exceed the 65 mph speed limit.

   (b) No, since at most 25.3% of vehicles in the sample exceed the 65 mph speed limit.

   (c) Yes, since at least 91.6% of vehicles in the sample exceed the 65 mph speed limit.

   (d) No, since at most 21.7% of vehicles in the sample exceed the 65 mph speed limit.

   (e) Yes, since at least 69.9% of vehicles in the sample exceed the 65 mph speed limit.

Question 8.

8. A *statistic* is

   (a) typically represented as a Greek letter such as μ or σ.

   (b) a formula used to calculate a correct answer.

   (c) a single number that summarizes the sample.

   (d) a single number that summarizes the population.

   (e) None of the above answers is correct.

Questions 9–12.
Wells Fargo Bank has several hundred thousand credit card customers, 15% of whom are at least two months late in their credit card payments. Suppose that four *Wells Fargo* credit card customers are randomly selected.

Find probabilities for the following events.

9. The first customer selected is not at least two months late,
the second customer is at least two months late,
the third customer is not at least two months late, and
the fourth customer is not at least two months late.

   (a) 0.0921 (b) 0.5609 (c) 0.4311 (d) 0.2727 (e) 0.5411

10. None of the four customers is at least two months late.

    (a) 0.3333 (b) 0.0921 (c) 0.5220 (d) 0.3278 (e) 0.4780

11. All four customers are at least two months late.

    (a) 0.3119 (b) 0.6720 (c) 0.3856 (d) 0.0005 (e) 0.1211

12. At least one of the four customers is at least two months late.

    (a) 0.3389 (b) 0.0921 (c) 0.5220 (d) 0.4780 (e) 0.9006

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Questions 13–15.
An investor is considering purchasing an oil field that contains 65 oil wells. She will buy the field if and only if at least 90% of the wells produce at least 20 barrels of oil per day. It is known that daily oil production by wells in the field has an approximately bell-shaped distribution. Information from a sample of five wells is shown below.

Well	Production in barrels per day
1	32
2	27
3	24
4	31
5	36

13. Calculate the sample mean $\bar{x}$.

    (a) 3 (b) 30 (c) 31 (d) 2.17 (e) None of the answers is correct.

14. Calculate the sample standard deviation s.

    (a) 21.50 (b) 17.20 (c) 4.64 (d) 4.15 (e) None of the answers is correct to the second decimal place.

15. Should the investor purchase the oil field?

    (a) Yes, since at least 95% of wells produce at least 20 barrels per day.

    (b) No, since approximately 68% of wells produce between 25.36 and 34.64 barrels per day.

    (c) No, since approximately 68% of wells produce between 25.85 and 34.15 barrels per day.

    (d) Yes, since 100% of the sample wells produce more than 20 barrels per day.

    (e) It is not possible to determine the correct answer on the basis of the given information.

Questions 16–17.
Joe runs every day as part of his conditioning program. He records his running distance in miles for each of the past 20 days (shown below.) Joe's daily run is easier if he runs less distance and harder if he runs more distance.

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1.5  3.4  4.5  1.4  2.2
1.9  1.0  3.0  2.8  2.8
3.6  2.4  2.5  0.7  1.0
4.0  4.0  2.7  3.3  4.8
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16. What is the best estimate of the maximum distance that Joe runs on the easiest 20% of his daily runs?

    (a) 4.0 (b) 1.9 (c) 4.5 (d) 2.75 (e) None of the answers is correct.

17. What is the best estimate of the minimum distance that Joe runs on the hardest 10% of his daily runs?

    (a) 4.0 (b) 1.9 (c) 4.5 (d) 2.75 (e) None of the answers is correct.

Questions 18–21.
A random sample of 199 UI students in Fall 2019 shows that 89 of the students live within one mile of campus and typically attend at least one party a week, 45 of the students do not live within one mile of campus and do not typically attend at least one party a week, and 111 of the students live within one mile of campus.

18. What is the probability that a student lives within one mile of campus?

    (a) 0.447 (b) 0.801 (c) 0.405 (d) 0.453 (e) None of the answers is correct to the third decimal place.

19. What is the probability that a student does not live within one mile of campus but typically attends at least one party a week?

    (a) 0.226 (b) 0.405 (c) 0.483 (d) 0.216 (e) None of the answers is correct to the third decimal place.

20. Now consider only those students who live within one mile of campus. What is the probability that such a student typically attends at least one party a week?

    (a) 0.46 (b) 0.45 (c) 0.41 (d) 0.80 (e) None of the answers is correct to the second decimal place.

21. Does whether or not a student typically attends at least one party a week depend upon whether or not the student lives within one mile of campus?

    (a) Yes, the probability of typically attending at least one party a week decreases from 0.663 to 0.447 if it is known that the student lives within one mile of campus.

    (b) Yes, the probability of typically attending at least one party a week increases from 0.447 to 0.558 if it is known that the student lives within one mile of campus.

    (c) Yes, the probability of typically attending at least one party a week increases from 0.663 to 0.801 if it is known that the student lives within one mile of campus.

    (d) Yes, the probability of typically attending at least one party a week increases from 0.663 to 0.674 if it is known that the student lives within one mile of campus.

    (e) No, the probability of typically attending at least one party a week does not change if it is known that the student lives within one mile of campus.

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Questions 22–24.
The probability distribution of blood types for people in the U.S. is shown below. Consider a married couple (husband and wife) and assume independence between their blood types.

Blood Type	**Probability**
O	0.45
A	0.40
B	0.11
AB	0.04

22. What is the probability that the husband does not have Type O blood?

    (a) 0.04 (b) 0.45 (c) 0.96 (d) 0.51 (e) None of the answers is correct.

23. What is the probability that one of the couple has Type A and the other has Type B?

    (a) 0.04 (b) 0.08 (c) 0.51 (d) 0.044 (e) None of the answers is correct.

24. What is the probability that the husband and wife share the same blood type?

    (a) 0.3762 (b) 0.0880 (c) 0.4900 (d) 0 (e) None of the answers is correct.

Questions 25–26.
A small brewery has two bottling machines. Machine 1 produces 75% of the bottles of beer while Machine 2 produces 25%. One out of every 20 bottles filled by Machine 1 is rejected because of poor quality, while one out of every 10 bottles from Machine 2 is rejected.

25. What percentage of bottles is rejected?

    (a) 7.5% (b) 6.25% (c) 8.75% (d) 40% (e) None of the answers is correct.

26. What is the probability that a randomly selected bottle comes from Machine 1, given that it is not rejected?

    (a) 0.76 (b) 0.05 (c) 0.7125 (d) 0.95 (e) None of the answers is correct.

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Questions 27–31.
A firm classifies its customer accounts in two ways: according to the balance outstanding and according to whether or not the account is overdue. The table below shows the proportions of accounts falling into various categories.

Account Balance	**Overdue**	**Not Overdue**
Under \$100	.08	.42
\$100 to \$500	.08	.22
Over \$500	.04	.16

27. What percentage of accounts are over \$500?
    (a) 20% (b) 4% (c) 80% (d) 88% (e) None of the answers is correct.

28. What percentage of accounts are either not overdue or under \$100?
    (a) 20% (b) 4% (c) 80% (d) 88% (e) None of the answers is correct.

29. If the account is overdue, what is the probability that its balance is under \$100?
    (a) 20% (b) 4% (c) 80% (d) 88% (e) None of the answers is correct.

30. What percentage of accounts that exceed \$500 are overdue?
    (a) 20% (b) 4% (c) 80% (d) 88% (e) None of the answers is correct.

31. Consider accounts with a balance of \$500 or less. What percentage of these accounts are not overdue?
    (a) 20% (b) 4% (c) 80% (d) 88% (e) None of the answers is correct.

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Questions 32–34.
An attorney files a lawsuit in a Federal appeals court that claims that a greater proportion of black potential jurors than nonblack potential jurors were excluded by judges from actually serving on trial juries in the Texas state court system prior to 1985. (Twelve individuals serve as jurors for any trial of a particular defendant charged with a crime.)

The attorney uses the claim to argue that black defendants in the Texas state court system were systematically discriminated against prior to 1985. Consider the following variables:

Variable 1 = Yes or No answer to whether an individual's race is black

Variable 2 = number of black potential jurors who are excluded from jury duty

Variable 3 = number of nonblack potential jurors who are excluded from jury duty

Variable 4 = Yes or No answer to whether an individual is excluded from jury duty

Variable 5 = number of black potential jurors who are considered for jury duty

Variable 6 = number of nonblack potential jurors who are considered for jury duty

Let **Step 1** of the **Six Steps of Inference** be given by

Question: Is the lawsuit's claim correct?

32. If **Step 2** is given by

    Population = all trials in the Texas state court system prior to 1985

    which of the six variables can be measured in **Step 4**?

    (a) Variables 1, 2, and 5
    (b) Variables 2, 3, 5, and 6
    (c) Variables 1 and 4
    (d) All six variables can be measured.
    (e) It is not possible to determine which variables can be measured based upon the available information.

33. If **Step 2** is given by

    Population = all individuals considered as potential jurors for trials in the Texas state court system prior to 1985

    which of the six variables can be measured in **Step 4**?

    (a) Variables 1, 2, and 5
    (b) Variables 2, 3, 5, and 6
    (c) Variables 1 and 4
    (d) All six variables can be measured.
    (e) It is not possible to determine which variables can be measured based upon the available information.

34. Suppose that a random sample of 100 trials in the Texas state court system prior to 1985 shows that 92% of the entire group of black potential jurors considered in any these trials were excluded from jury duty. Does the lawsuit's claim appear to be correct?

    (a) Yes since 92% is abnormally high.

    (b) Yes since 92% exceeds 50%.

    (c) No since 92% is less than 100%.

    (d) Yes since only eight of the trials in the sample have black potential jurors who are not excluded.

    (e) It is not possible to determine if the claim is correct based upon the available information.

(end Exam 1 Additional Practice)

Solution

1. e
2. a
3. a
4. c
5. c
6. d
7. e
8. c
9. a
10. c
11. d
12. d
13. b
14. c
15. a
16. e 1.4 miles
17. c
18. e 0.558
19. d
20. d
21. c
22. e 0.55
23. e 0.088
24. a
25. b
26. a
27. a
28. d
29. e 40%
30. a
31. c

32. b

33. c

34. e To evaluate the claim, we need to compare the 92% figure to the percentage of nonblack potential jurors who are excluded in the sample, a percentage that is not provided.