Stats Test 4
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Name_____

MULTIPLE CHOICE.

1) The mean score, $\bar{x}$, on an aptitude test for a random sample of 3 students was 65. Assuming that $\sigma = 14$, construct a 95.44% confidence interval for the mean score, μ, of all students taking the test.

    A) 48.8 to 81.2   B) 52.9 to 77.1   C) 37 to 93   D) 55.7 to 74.3

1) _____

Find the confidence interval specified.

2) Physiologists often use the *forced vital capacity* as a way to assess a person's ability to move air in and out of their lungs. A researcher wishes to estimate the forced vital capacity of people suffering from asthma. A random sample of 15 asthmatics yields the following data on forced vital capacity, in liters.

       5.1 4.9 4.7 3.1 4.3
       3.7 3.7 4.3 3.5 5.2
       3.2 3.5 4.8 4.0 5.1

Use the data to obtain a 95.44% confidence interval for the mean forced vital capacity for all asthmatics. Assume that $\sigma = 0.7$.

    A) 3.85 to 4.57 liters   B) 62.74 to 63.46 liters
    C) 2.81 to 5.61 liters   D) 4.11 to 4.30 liters

2) _____

3) A laboratory tested twelve chicken eggs and found that the mean amount of cholesterol was 188 milligrams with s = 12.7 milligrams. Construct a 95% confidence interval for the true mean cholesterol content of all such eggs.

    A) 180.0 to 196.0 milligrams   B) 179.8 to 196.2 milligrams
    C) 179.9 to 196.1 milligrams   D) 181.4 to 194.6 milligrams

3) _____

4) Thirty randomly selected students took the calculus final. If the sample mean was 93 and the standard deviation was 13.3, construct a 99% confidence interval for the mean score of all students.

    A) 87.02 to 98.98   B) 86.33 to 99.67   C) 88.87 to 97.13   D) 86.31 to 99.69

4) _____

5) The manufacturer of a refrigerator system for beer kegs produces refrigerators that are supposed to maintain a mean temperature, μ, of 47°F, ideal for a certain type of German pilsner. The owner of the brewery does not agree with the refrigerator manufacturer, and wants to conduct a hypothesis test to determine whether the true mean temperature differs from this value.

    A) $H_0 : \mu \geq 47°F$ B) $H_0 : \mu \leq 47°F$ C) $H_0 : \mu \neq 47°F$ D) $H_0 : \mu = 47°F$
       $H_a : \mu < 47°F$ $H_a : \mu > 47°F$ $H_a : \mu = 47°F$ $H_a : \mu \neq 47°F$

5) _____

6) In the past, the mean running time for a certain type of flashlight battery has been 9.7 hours. The manufacturer has introduced a change in the production method and wants to perform a hypothesis test to determine whether the mean running time has changed as a result.

    A) $H_0 : \mu = 9.7$ hours   B) $H_0 : \mu \geq 9.7$ hours
       $H_a : \mu \neq 9.7$ hours $H_a : \mu = 9.7$ hours
    C) $H_0 : \mu \neq 9.7$ hours   D) $H_0 : \mu = 9.7$ hours
       $H_a : \mu = 9.7$ hours $H_a : \mu > 9.7$ hours

6) _____

Classify the hypothesis test as two–tailed, left–tailed, or right–tailed.

7) A health insurer has determined that the "reasonable and customary" fee for a certain medical procedure is $1200. They suspect that the average fee charged by one particular clinic for this procedure is higher than $1200. The insurer wants to perform a hypothesis test to determine whether their suspicion is correct.

A) Two–tailed   B) Left–tailed   C) Right–tailed

7) _____

8) The recommended dietary allowance (RDA) of vitamin C for women is 75 milligrams per day. A hypothesis test is to be performed to decide whether adult women are, on average, getting less than the RDA of 75 milligrams per day.

A) Two–tailed   B) Left–tailed   C) Right–tailed

8) _____

9) In the past, the mean running time for a certain type of flashlight battery has been 8.1 hours. The manufacturer has introduced a change in the production method and wants to perform a hypothesis test to determine whether the mean running time has changed as a result.

A) Two–tailed   B) Left–tailed   C) Right–tailed

9) _____

For the given hypothesis test, explain the meaning of a Type I error, a Type II error, or a correct decision as specified.

10) In 2000, the mean math SAT score for students at one school was 495. Five years later, in 2005, a teacher performed a hypothesis test to determine whether the average math SAT score of students at the school had changed from the 2000 mean of 495. The hypotheses were:

$$H_0 : \mu = 495$$
$$H_a : \mu \neq 495$$

where μ is the mean math SAT score, in 2005, for students at the school
Explain the meaning of a Type II error.

A) A Type II error would occur if, in fact, $\mu = 495$, but the results of the sampling lead to the conclusion that $\mu \neq 495$

B) A Type II error would occur if, in fact, $\mu = 495$, but the results of the sampling do not lead to rejection of that fact

C) A Type II error would occur if, in fact, $\mu \neq 495$, and the results of the sampling lead to that conclusion.

D) A Type II error would occur if, in fact, $\mu \neq 495$, but the results of the sampling fail to lead to that conclusion.

10) _____

11) In the past, the mean running time for a certain type of flashlight battery has been 8.2 hours. The manufacturer has introduced a change in the production method and wants to perform a hypothesis test to determine whether the mean running time has increased as a result. The hypotheses are:

$$H_0 : \mu = 8.2 \text{ hours}$$
$$H_a : \mu > 8.2 \text{ hours}$$

where μ is the mean running time of the new batteries . Explain the meaning of a Type I error.

A) A Type I error would occur if, in fact, $\mu > 8.2$ hours, but the results of the sampling lead to the conclusion that $\mu < 8.2$ hours.

B) A Type I error would occur if, in fact, $\mu = 8.2$ hours, but the results of the sampling lead to the conclusion that $\mu > 8.2$ hours.

C) A Type I error would occur if, in fact, $\mu = 8.2$ hours, but the results of the sampling do not lead to rejection of that fact.

D) A Type I error would occur if, in fact, $\mu > 8.2$ hours, but the results of the sampling fail to lead to that conclusion.

11) _____

Use the one-proportion z-interval procedure to find the required confidence interval.

12) A researcher wishes to estimate the proportion of adults in the city of Darby who are vegetarian. In a random sample of 713 adults from this city, the proportion that are vegetarian is 0.078. Find a 99% confidence interval for the proportion of all adults in the city of Darby that are vegetarians.

    A) 0.0521 to 0.1039   B) 0.0298 to 0.1262
    C) 0.0619 to 0.0941   D) 0.0680 to 0.0880

12) _____

13) Of 363 randomly selected medical students, 20 said that they planned to work in a rural community. Find a 95% confidence interval for the proportion of all medical students who plan to work in a rural community.

    A) 0.0243 to 0.0859   B) 0.0316 to 0.0786
    C) 0.0272 to 0.0830   D) 0.0354 to 0.0748

13) _____

SHORT ANSWER:

14) Give an example of a situation in which you might wish to conduct a two-tailed hypothesis test concerning a population mean. State in words what you wish to determine and write the null and alternative hypotheses in words and symbolically.

14) _____

15) Give an example of a situation in which you might wish to conduct a right-tailed hypothesis test concerning a population mean. State in words what you wish to determine and write the null and alternative hypotheses in words and symbolically.

15) _____

16) A test of sobriety involves measuring a subject's motor skills. The mean score for men who   16) _____
are sober is known to be 35.0. A researcher would like to perform a hypothesis test to
determine whether the mean score for sober women differs from 35.0. Twenty randomly
selected sober women take the test and produce a mean score of 41.0 with a standard
deviation of 3.7. Perform the hypothesis test at the 0.01 level of significance.

17) Last year, the mean running time for a certain type of flashlight battery was 8.5 hours. This   17) _____
year, the manufacturer has introduced a change in the production method which he hopes
will increase the mean running time. A random sample of 40 of the new light bulbs was
obtained and the mean running time was found to be 8.7 hours. Do the data provide
sufficient evidence to conclude that the mean running time, μ, of the new light bulbs is
larger than last year's mean of 8.5 hours? Perform the appropriate hypothesis test using a
significance level of 5%. Assume that $\sigma = 0.5$ hours.

18) In one city, the average amount of time that tenth–graders spend watching television each week is 21.6 hours. The principal of Birchwood High School believes that at his school, tenth–graders watch less television. For a sample of 28 tenth–graders from Birchwood High School, the mean amount of time spent watching television per week was 19.4 hours. Do the data provide sufficient evidence to conclude that for tenth–graders at Birchwood High School, the mean amount of time spent watching television per week is less than the city average of 21.6 hours? Perform the appropriate hypothesis test using a significance level of 5%. Assume that $\sigma = 7.2$ hours.

18) _____

19) A researcher was interested in comparing the resting pulse rates of people who exercise regularly and people who do not exercise regularly. Independent simple random samples of 16 people ages 30–40 who do not exercise regularly and 12 people ages 30–40 who exercise regularly were selected, and the resting pulse rate (in beats per minute) of each person was measured. The summary statistics are as follows.

19) _____

Do Not Exercise	Do Exercise
$\bar{x}_1 = 73.5$	$\bar{x}_2 = 68.5$
$s_1 = 10.9$	$s_2 = 8.2$
$n_1 = 16$	$n_2 = 12$

At the 2.5% significance level, do the data provide sufficient evidence to conclude that the mean resting pulse rate of people who do not exercise regularly is greater than the mean resting pulse rate of people who exercise regularly?

20) A researcher wishes to determine whether people with high blood pressure can lower their blood pressure by performing yoga exercises. A treatment group and a control group are selected. The sample statistics are given below. Construct a 90% confidence interval for the difference between the two population means, $\mu_1 - \mu_2$. Would you recommend using yoga exercises? Explain your reasoning.

20) _____

Treatment Group	Control Group
$n_1 = 100$	$n_2 = 100$
$\bar{x}_1 = 178$	$\bar{x}_2 = 193$
$s_1 = 35$	$s_2 = 37$