STAT 3309 - SP 2017

EXAM 2 PRACTICE PROBLEMS

Name:_____

* Turn in with work, SAT, MARCH, 25

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) For some value of Z, the value of the cumulative standardized normal distribution is 0.2090. The value of Z is 1) _____
A) -0.31 B) 1.96 C) 0.31 D) -0.81

2) The value of the cumulative standardized normal distribution at Z is 0.6255. The value of Z is 2) _____
A) 0.16 B) 0.40 C) 0.32 D) 0.99

3) For some value of Z, the value of the cumulative standardized normal distribution is 0.8340. The value of Z is 3) _____
A) 1.06 B) 0.37 C) 0.97 D) 0.07

4) The value of the cumulative standardized normal distribution at $1.5X$ is 0.9332. The value of X is 4) _____
A) 1.00 B) 1.50 C) 0.10 D) 0.50

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

5) Given that X is a normally distributed variable with a mean of 50 and a standard deviation of 2, find the probability that X is between 47 and 54. 5) _____

6) Suppose Z has a standard normal distribution with a mean of 0 and standard deviation of 1. The probability that Z is less than -2.20 is _____. 6) _____

7) Suppose Z has a standard normal distribution with a mean of 0 and standard deviation of 1. The probability that Z is between -2.33 and 2.33 is _____. 7) _____

8) Suppose Z has a standard normal distribution with a mean of 0 and standard deviation of 1. So 27% of the possible Z values are smaller than _____. 8) _____

9) Suppose Z has a standard normal distribution with a mean of 0 and standard deviation of 1. So 85% of the possible Z values are smaller than _____. 9) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

10) If we know that the length of time it takes a college student to find a parking spot in the library parking lot follows a normal distribution with a mean of 3.5 minutes and a standard deviation of 1 minute, find the probability that a randomly selected college student will find a parking spot in the library parking lot in less than 3 minutes. 10) _____
A) 0.2674 B) 0.3551 C) 0.1915 D) 0.3085

11) If we know that the length of time it takes a college student to find a parking spot in the library parking lot follows a normal distribution with a mean of 3.5 minutes and a standard deviation of 1 minute, find the probability that a randomly selected college student will take between 2 and 4.5 minutes to find a parking spot in the library parking lot. 11) _____

A) 0.4938 B) 0.0919 C) 0.7745 D) 0.2255

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

12) The amount of tea leaves in a can from a particular production line is normally distributed with $\mu = 110$ grams and $\sigma = 25$ grams. What is the probability that a randomly selected can will contain less than 100 grams of tea leaves? 12) _____

13) The amount of tea leaves in a can from a particular production line is normally distributed with $\mu = 110$ grams and $\sigma = 25$ grams. What is the probability that a randomly selected can will contain between 100 and 120 grams of tea leaves? 13) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

14) The standard error of the mean 14) _____

A) measures the variability of the mean from sample to sample.
B) decreases as the sample size increases.
C) is never larger than the standard deviation of the population.
D) All of the above.

15) For air travelers, one of the biggest complaints is of the waiting time between when the airplane taxis away from the terminal until the flight takes off. This waiting time is known to have a right skewed distribution with a mean of 10 minutes and a standard deviation of 8 minutes. Suppose 100 flights have been randomly sampled. Describe the sampling distribution of the mean waiting time between when the airplane taxis away from the terminal until the flight takes off for these 100 flights. 15) _____

A) Distribution is right skewed with mean = 10 minutes and standard error = 8 minutes.
B) Distribution is approximately normal with mean = 10 minutes and standard error = 8 minutes.
C) Distribution is right skewed with mean = 10 minutes and standard error = 0.8 minutes.
D) Distribution is approximately normal with mean = 10 minutes and standard error = 0.8 minutes.

16) Sales prices of baseball cards from the 1960s are known to possess a right skewed distribution with a mean sale price of \$5.25 and a standard deviation of \$2.80. Suppose a random sample of 100 cards from the 1960s is selected. Describe the sampling distribution for the sample mean sale price of the selected cards. 16) _____

A) Normal with a mean of \$5.25 and a standard error of \$0.28
B) Right skewed with a mean of \$5.25 and a standard error of \$0.28
C) Normal with a mean of \$5.25 and a standard error of \$2.80
D) Right skewed with a mean of \$5.25 and a standard error of \$2.80

17) True or False: The standard error of the sampling distribution of a sample proportion is $\sqrt{\frac{\rho(1-\rho)}{n}}$ 17) _____

where ρ is the sample proportion.

A) True B) False

Solve the problem.

18) Find $z_{\alpha/2}$ for the given value of α. 18) _____

$\alpha = 0.14$

A) 1.58 B) 1.48 C) 1.08 D) 0.14

19) An economist is interested in studying the incomes of consumers in a particular country. The population standard deviation is known to be \$1,000. A random sample of 50 individuals resulted in a mean income of \$15,000. What is the width of the 90% confidence interval? 19) _____

A) \$465.23 B) \$232.60 C) \$728.60 D) \$364.30

Solve the problem.

20) A random sample of 250 students at a university finds that these students take a mean of 15.3 credit hours per quarter with a standard deviation of 1.6 credit hours. Estimate the mean credit hours taken by a student each quarter using a 95% confidence interval. Round to the nearest thousandth. 20) _____

A) 15.3 ± .198 B) 15.3 ± .157 C) 15.3 ± .013 D) 15.3 ± .010

21) An economist is interested in studying the incomes of consumers in a particular country. The population standard deviation is known to be \$1,000. A random sample of 50 individuals resulted in a mean income of \$15,000. What is the upper end point in a 99% confidence interval for the average income? 21) _____

A) \$15,364 B) \$15,052 C) \$15,141 D) \$15,330

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

22) The following data represent the scores of a sample of 50 randomly chosen students on a standardized test. 22) _____

39	48	55	63	66	68	68	69	70	71
71	71	73	74	76	76	76	77	78	79
79	79	79	80	80	82	83	83	83	85
85	86	86	88	88	88	88	89	89	89
90	91	92	92	93	95	96	97	97	99

a. Write a 95% confidence interval for the mean score of all students who took the test.

b. Identify the target parameter and the point estimator.

t-distribution

23) **(t-dist)** Suppose you selected a random sample of $n = 7$ measurements from a normal distribution. Compare the standard normal z value with the corresponding t value for a 90% confidence interval. 23) _____

24) Suppose you selected a random sample of $n = 29$ measurements from a normal distribution. Compare the standard normal z value with the corresponding t value for a 95% confidence interval. 24) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

25) Fifteen SmartCars were randomly selected and the highway mileage of each was noted. The analysis yielded a mean of 47 miles per gallon and a standard deviation of 5 miles per gallon. Which of the following would represent a 90% confidence interval for the average highway mileage of all SmartCars? 25) _____

A) $47 \pm 1.645\frac{5}{\sqrt{15}}$ B) $47 \pm 1.753\frac{5}{\sqrt{15}}$ C) $47 \pm 1.345\frac{5}{\sqrt{15}}$ D) $47 \pm 1.761\frac{5}{\sqrt{15}}$

26) How much money does the average professional football fan spend on food at a single football game? That question was posed to 10 randomly selected football fans. The sample results provided a sample mean and standard deviation of \$14.00 and \$2.50, respectively. Use this information to construct a 90% confidence interval for the mean. 26) _____

A) $14 \pm 1.833(2.50/\sqrt{10})$ B) $14 \pm 1.383(2.50/\sqrt{10})$
C) $14 \pm 1.812(2.50/\sqrt{10})$ D) $14 \pm 1.796(2.50/\sqrt{10})$

27) You are interested in purchasing a new car. One of the many points you wish to consider is the resale value of the car after 5 years. Since you are particularly interested in a certain foreign sedan, you decide to estimate the resale value of this car with a 95% confidence interval. You manage to obtain data on 17 recently resold 5-year-old foreign sedans of the same model. These 17 cars were resold at an average price of \$12,610 with a standard deviation of \$700. What is the 95% confidence interval for the true mean resale value of a 5- year-old car of this model? 27) _____

A) $12{,}610 \pm 2.120(700/\sqrt{16})$ B) $12{,}610 \pm 1.960(700/\sqrt{17})$
C) $12{,}610 \pm 2.110(700/\sqrt{17})$ D) $12{,}610 \pm 2.120(700/\sqrt{17})$

CI for Proportions

28) A marketing research company is estimating which of two soft drinks college students prefer. A random sample of 157 college students produced the following confidence interval for the proportion of college students who prefer drink A: (.344, .494). Is this a large enough sample for this analysis to work? 28) _____

A) Yes, since $n = 157$ (which is 30 or more).
B) Yes, since both $\hat{np} \geq 15$ and $\hat{nq} \geq 15$.
C) No.
D) It is impossible to say with the given information.

29) A random sample of 4000 U.S. citizens yielded 2250 who are in favor of gun control legislation. Estimate the true proportion of all Americans who are in favor of gun control legislation using a 90% confidence interval. 29) _____

A) $.4375 \pm .4048$ B) $.5625 \pm .4048$ C) $.4375 \pm .0129$ D) $.5625 \pm .0129$

30) A university dean is interested in determining the proportion of students who receive some sort of financial aid. Rather than examine the records for all students, the dean randomly selects 200 students and finds that 118 of them are receiving financial aid. Use a 95% confidence interval to estimate the true proportion of students who receive financial aid. 30) _____

A) $.59 \pm .474$ B) $.59 \pm .002$ C) $.59 \pm .005$ D) $.59 \pm .068$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

31) A random sample of 50 employees of a large company was asked the question, "Do you participate in the company's stock purchase plan?" The answers are shown below. 31) _____

yes	no	no	yes	no	no	yes	yes	no	no
no	yes	yes	yes	no	yes	no	no	yes	yes
no	yes	yes	no	yes	yes	no	yes	yes	yes
yes	no	no	yes	yes	yes	yes	yes	no	yes
no	yes	yes	no	yes	yes	yes	yes	yes	yes

Use a 90% confidence interval to estimate the proportion of employees who participate in the company's stock purchase plan.

Determin Sample sizes

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

32) We intend to estimate the average driving time of a group of commuters. From a previous study, we believe that the average time is 42 minutes with a standard deviation of 12 minutes. We want our 99 percent confidence interval to have a margin of error of no more than plus or minus 3 minutes. What is the smallest sample size that we should consider? 32) _____

A) 107 B) 319 C) 9 D) 11

33) A local men's clothing store is being sold. The buyers are trying to estimate the percentage of items that are outdated. They will choose a random sample from the 100,000 items in the store's inventory in order to determine the proportion of merchandise that is outdated. The current owners have never determined the percentage of outdated merchandise and cannot help the buyers. How large a sample do the buyers need in order to be 95% confident that the margin of error of their estimate is about 5%? 33) _____

A) 769 B) 1537 C) 196 D) 385

Testing Poplulation Mean

34) How many tissues should a package of tissues contain? Researchers have determined that a person uses an average of 69 tissues during a cold. Suppose a random sample of 2500 people yielded the following data on the number of tissues used during a cold: $\bar{x} = 60$, $s = 16$. Suppose the corresponding test statistic falls in the rejection region at $\alpha = .05$. What is the correct conclusion? 34) _____

A) At $\alpha = .10$, reject H_a. B) At $\alpha = .05$, accept H_a.

C) At $\alpha = .10$, reject H_0. D) At $\alpha = .05$, reject H_0.

Show work (1) Write hypothesis (2) Calculate test statistics (3) Find critical value and P-value (4) Make decicisions

35) A large university is interested in learning about the average time it takes students to drive to campus. The university sampled 238 students and asked each to provide the amount of time they spent traveling to campus. This variable, travel time, was then used conduct a test of hypothesis. The goal was to determine if the average travel time of all the university's students differed from 20 minutes. Find the large-sample rejection region for the test of interest to the college when using a level of significance of 0.05. 35) _____

A) Reject H_0 if $z < -1.645$ or $z > 1.645$. B) Reject H_0 if $z < -1.96$ or $z > 1.96$.

C) Reject H_0 if $z > 1.645$. D) Reject H_0 if $z < -1.96$.

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yes	no	no	yes	no	no	yes	yes	no	no
no	yes	yes	yes	no	yes	no	no	yes	yes
no	yes	yes	no	yes	yes	no	yes	yes	yes
yes	no	no	yes	yes	yes	yes	yes	no	yes
no	yes	yes	no	yes	yes	yes	yes	yes	yes

Use a 90% confidence interval to estimate the proportion of employees who participate in the company's stock purchase plan.

Determin Sample sizes

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32) We intend to estimate the average driving time of a group of commuters. From a previous study, we believe that the average time is 42 minutes with a standard deviation of 12 minutes. We want our 99 percent confidence interval to have a margin of error of no more than plus or minus 3 minutes. What is the smallest sample size that we should consider? 32) _____

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A) At $\alpha = .10$, reject H_a. B) At $\alpha = .05$, accept H_a.

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A) Reject H_0 if $z < -1.645$ or $z > 1.645$. B) Reject H_0 if $z < -1.96$ or $z > 1.96$.

C) Reject H_0 if $z > 1.645$. D) Reject H_0 if $z < -1.96$.

Show work (1) Write hypothesis (2) Calculate test statistics (3) Find critical value and P-value (4) Make decicisions

36) A national organization has been working with utilities throughout the nation to find sites for large wind machines that generate electricity. Wind speeds must average more than 16 miles per hour (mph) for a site to be acceptable. Recently, the organization conducted wind speed tests at a particular site. Based on a sample of $n = 50$ wind speed recordings (taken at random intervals), the wind speed at the site averaged $\bar{x} = 16.7$ mph, with a standard deviation of $s = 3.6$ mph. To determine whether the site meets the organization's requirements, consider the test, H_0: $\mu = 16$ vs. H_a: $\mu > 16$, where μ is the true mean wind speed at the site and $\alpha = .01$. Suppose the value of the test statistic were computed to be 1.37. State the conclusion. 36) _____

A) At $\alpha = .01$, there is insufficient evidence to conclude the true mean wind speed at the site exceeds 16 mph.

B) At $\alpha = .01$, there is sufficient evidence to conclude the true mean wind speed at the site exceeds 16 mph.

C) We are 99% confident that the site meets the organization's requirements.

D) We are 99% confident that the site does not meet the organization's requirements.

Show work (1) Write hypothesis (2) Calculate test statistics (3) Find critical value and P-value (4) Make decicisions

37) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but now are beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was \$215.00. A random sample of n = 200 cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than \$215.00. Find the large-sample rejection region appropriate for this test if we are using $\alpha = 0.05$. 37) _____

A) Reject H_0 if $z < -1.96$.

B) Reject H_0 if $z < -1.645$ or $z > 1.645$.

C) Reject H_0 if $z < -1.96$ or $z > 1.96$.

D) Reject H_0 if $z > 1.645$.

Show work (1) Write hypothesis (2) Calculate test statistics (3) Find critical value and P-value (4) Make decicisions

38) A local eat-in pizza restaurant wants to investigate the possibility of starting to deliver pizzas. The owner of the store has determined that home delivery will be successful only if the average time spent on a delivery does not exceed 35 minutes. The owner has randomly selected 24 customers and delivered pizzas to their homes in order to test whether the mean delivery time actually exceeds 35 minutes. Suppose the p-value for the test was found to be .0274. State the correct conclusion. 38) _____

A) At $\alpha = .05$, we fail to reject H_0.

B) At $\alpha = .025$, we fail to reject H_0.

C) At $\alpha = .02$, we reject H_0.

D) At $\alpha = .03$, we fail to reject H_0.

Show work (1) Write hypothesis (2) Calculate test statistics (3) Find critical value and P-value (4) Make decicisions

39) The business college computing center wants to determine the proportion of business students who have laptop computers. If the proportion exceeds 35%, then the lab will scale back a proposed enlargement of its facilities. Suppose 300 business students were randomly sampled and 85 have laptops. Find the rejection region for the corresponding test using $\alpha = .10$. 39) _____

A) Reject H_0 if $z > 1.28$.

B) Reject H_0 if $z = 1.28$.

C) Reject H_0 if $z < -1.28$.

D) Reject H_0 if $z > 1.645$ or $z < -1.645$.

Show work (1) Write hypothesis (2) Calculate test statistics (3) Find critical value and P-value (4) Make decicisions