

Exam

Name _____

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

- 1) Compute the critical value $z_{\alpha/2}$ that corresponds to a 95% level of confidence. 1) _____
A) 1.645 B) 2.575 C) 1.96 D) 2.33
- 2) In a sample of 10 randomly selected women, it was found that their mean height was 63.4 inches. From previous studies, it is assumed that the standard deviation, σ , is 2.4. Construct the 95% confidence interval for the population mean. 2) _____
A) (60.8, 65.4) B) (58.1, 67.3) C) (59.7, 66.5) D) (61.9, 64.9)
- 3) A group of 49 randomly selected students has a mean age of 22.4 years with a population standard deviation of 3.8. Construct a 98% confidence interval for the population mean. 3) _____
A) (20.3, 24.5) B) (21.1, 23.7) C) (18.8, 26.3) D) (19.8, 25.1)
- 4) Suppose a 99% confidence interval for μ turns out to be (190, 250). Based on the interval, do you believe the average is equal to 290? 4) _____
A) No, and I am 100% sure of it. B) No, and I am 99% sure of it.
C) Yes, and I am 99% sure of it. D) Yes, and I am 100% sure of it.
- 5) Which of the following is not a characteristic of Students' t distribution? 5) _____
A) mean of 1
B) For large samples, the t and z distributions are nearly equivalent.
C) depends on degrees of freedom.
D) symmetric distribution

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

- 6) In order to set rates, an insurance company is trying to estimate the number of sick days that full time workers at an auto repair shop take per year. A previous study indicated that the standard deviation was 2.2 days. a) How large a sample must be selected if the company wants to be 90% confident that the true mean differs from the sample mean by no more than 1 day? b) Repeat part (a) using a 95% confidence interval. Which level of confidence requires a larger sample size? Explain. 6) _____

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- 7) A computer package was used to generate the following printout for estimating the sale price of homes in a particular neighborhood. 7) _____

X = sale_price

SAMPLE MEAN OF X =	46,400
SAMPLE STANDARD DEV =	13,747
SAMPLE SIZE OF X =	15
CONFIDENCE =	98
UPPER LIMIT =	55,713.80
SAMPLE MEAN OF X =	46,400
LOWER LIMIT =	37,086.20

What assumptions are necessary for any inferences derived from this printout to be valid?

- A) The sample variance equals the population variance.
B) The population mean has an approximate normal distribution.
C) The sample was randomly selected from an approximately normal population.
D) All of the above are necessary.
- 8) A random sample of 50 students has a test score average with a standard deviation of 10.9. Find the margin of error if $c = 0.90$. 8) _____
A) 1.39 B) 1.54 C) 0.36 D) 2.54
- 9) Let t_0 be a specific value of t . Find t_0 such that the following statement is true: 9) _____
 $P(t \geq t_0) = .1$ where $df = 20$
A) 1.325 B) -1.325 C) -1.328 D) 1.328
- 10) Find the critical t -value that corresponds to $c = 0.90$ and $n = 15$. 10) _____
A) 2.624 B) 2.145 C) 1.761 D) 1.345
- 11) Construct a 90% confidence interval for the population mean, μ . Assume the population has a normal distribution. A sample of 15 randomly selected students has a grade point average of 2.86 with a standard deviation of 0.78. 11) _____
A) (2.41, 3.42) B) (2.37, 3.56) C) (2.28, 3.66) D) (2.51, 3.21)
- 12) A random sample of 10 parking meters in a beach community showed the following incomes for a day. Assume the incomes are normally distributed. 12) _____
\$3.60 \$4.50 \$2.80 \$6.30 \$2.60 \$5.20 \$6.75 \$4.25 \$8.00 \$3.00
Find the 95% confidence interval for the true mean.
A) (\$3.39, \$6.01) B) (\$1.35, \$2.85) C) (\$4.81, \$6.31) D) (\$2.11, \$5.34)

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- 13) a) Construct a 95% confidence interval for the population mean, μ . Assume the population has a normal distribution. In a random sample of 26 computers, the mean repair cost was \$157 with a standard deviation of \$33. 13) _____
b) Suppose you did some research on repair costs for computers and found that the standard deviation is $\sigma = 33$. Use the normal distribution to construct a 95% confidence interval for the population mean, μ . Compare the results.
- 14) When 390 college students were surveyed, 110 said they own their car. Construct a 95% confidence interval for the proportion of college students who say they own their cars. 14) _____

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- 15) An article a Florida newspaper reported on the topics that teenagers most want to discuss with their parents. The findings, the results of a poll, showed that 46% would like more discussion about the family's financial situation, 37% would like to talk about school, and 30% would like to talk about religion. These and other percentages were based on a national sampling of 513 teenagers. Estimate the proportion of all teenagers who want more family discussions about school. Use a 90% confidence level. 15) _____
A) $.37 \pm .035$ B) $.37 \pm .002$ C) $.63 \pm .002$ D) $.63 \pm .035$
- 16) A confidence interval for p can be constructed using 16) _____
A) $p \pm z_{\alpha/2} \sqrt{\frac{p(1-p)}{n}}$ B) $p \pm z \frac{\sigma}{n}$
C) $\hat{p} \pm z \sqrt{\frac{\sigma}{n}}$ D) $\hat{p} \pm z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$
- 17) A pollster wishes to estimate the proportion of United States voters who favor capital punishment. How large a sample is needed in order to be 95% confident that the sample proportion will not differ from the true proportion by more than 4%? 17) _____
A) 13 B) 423 C) 601 D) 1201

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- 18) In a college student poll, it is of interest to estimate the proportion p of students in favor of changing from a quarter-system to a semester-system. How many students should be polled so that we can estimate p to within .09 using a 99% confidence interval? 18) _____
- 19) A local politician, running for reelection, claims that the mean prison time for car thieves is less than the required 6 years. A sample of 80 convicted car thieves was randomly selected, and the mean length of prison time was found to be 5 years and 6 months, with a standard deviation of 1 year and 3 months. At $\alpha = 0.05$, test the politician's claim. 19) _____

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- 20) In a one-tailed test of the hypothesis using the classical method, the critical region is the area under the graph located 20) _____
- A) Below the mean on the side of the graph opposite the critical value
 - B) Only at the critical value
 - C) In the tail
 - D) Between the critical value and the mean
- 21) Suppose you are using $\alpha = 0.05$ to test the claim that $\mu \neq 32$ using a P-value. You are given the sample statistics $n = 35$, $\bar{x} = 31.1$, and $\sigma = 2.7$. Find the P-value. 21) _____
- A) 0.1003 B) 0.0448 C) 0.0244 D) 0.0591
- 22) Given $H_0: \mu = 25$, $H_1: \mu \neq 25$, and $P = 0.028$. Do you reject or fail to reject H_0 at the 0.01 level of significance? 22) _____
- A) reject H_0
 - B) fail to reject H_0
 - C) not sufficient information to decide

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- 23) A fast food outlet claims that the mean waiting time in line is less than 3 minutes. A random sample of 60 customers has a mean of 2.9 minutes with a standard deviation of 0.6 minute. If $\alpha = 0.05$, test the fast food outlet's claim using P-values. 23) _____

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- 24) What is a p -value? 24) _____
- A) A probability of observing a sample statistic more extreme than the one observed under the assumption that the null hypothesis is true.
 - B) A probability of observing a population statistic more extreme than the one observed under the assumption that the null hypothesis is false.
 - C) A probability of observing a population statistic more extreme than the one observed under the assumption that the null hypothesis is true.
 - D) A probability of observing a sample statistic more extreme than the one observed under the assumption that the null hypothesis is false.

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- 25) Use a t-test to test the claim $\mu = 30$ at $\alpha = 0.01$, given the sample statistics $n = 12$, $\bar{x} = 31.2$, and $s = 2.2$. 25) _____

- 26) Use a t-test to test the claim $\mu = 21$ at $\alpha = 0.01$, given the sample statistics $n = 12$, $\bar{x} = 20.5$, and $s = 2.1$. 26) _____
- 27) A local group claims that the police issue at least 60 speeding tickets a day in their area. To prove their point, they randomly select two weeks. Their research yields the number of tickets issued for each day. The data are listed below. At $\alpha = 0.01$, test the group's claim. 27) _____
- 70 48 41 68 69 55 70 57 60 83
32 60 72 58

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- 28) 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 if the average time spent on the deliveries does not exceed 33 minutes. The owner has randomly selected 16 customers and has delivered pizzas to their homes in order to test if the mean delivery time actually exceeds 33 minutes. Suppose the p-value for the test was found to be .0273. State the correct conclusion. 28) _____
- A) At $\alpha = .025$, we fail to reject H_0 . B) At $\alpha = .03$, we fail to reject H_0 .
C) At $\alpha = .02$, we reject H_0 . D) At $\alpha = .05$, we fail to reject H_0 .
- 29) The business college computing center wants to determine the proportion of business students who have personal computers (PC's) at home. 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 PC's at home. Find the rejection region for this test using $\alpha = .10$. 29) _____
- 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 $z < -1.645$.
- 30) The business college computing center wants to determine the proportion of business students who have personal computers (PC's) at home. If the proportion exceeds 30%, then the lab will scale back a proposed enlargement of its facilities. Suppose 250 business students were randomly sampled and 65 have PC's at home. What assumptions are necessary for this test to be satisfied? 30) _____
- A) The sample mean equals the population mean.
B) The population has an approximately normal distribution.
C) The sample variance equals the population variance.
D) None of the above are necessary.
- 31) Determine the critical value, z_0 , to test the claim about the population proportion $p \geq 0.132$ given $n = 48$ and $\hat{p} = 0.110$. Use $\alpha = 0.05$. 31) _____
- A) -2.575 B) -1.96 C) -1.645 D) -2.33

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32) Fifty-five percent of registered voters in a congressional district are registered Democrats. The Republican candidate takes a poll to assess his chances in a two-candidate race. He polls 1200 potential voters and finds that 621 plan to vote for the Democratic candidate. Does the Republican candidate have a chance to win? Use $\alpha = 0.05$. 32) _____

33) A coin is tossed 1000 times and 570 heads appear. At $\alpha = 0.05$, test the claim that this is not a biased coin. 33) _____

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34) A survey claims that 9 out of 10 doctors (i.e., 90%) recommend brand Z for their patients who have children. To test this claim against the alternative that the actual proportion of doctors who recommend brand Z is less than 90%, a random sample of doctors was taken. Suppose the test statistic is $z = -1.95$. Can we conclude that H_0 should be rejected at the a) $\alpha = .10$, b) $\alpha = .05$, and c) $\alpha = .01$ level? 34) _____

A) a) no; b) no; c) yes

B) a) yes; b) yes; c) no

C) a) no; b) no; c) no

D) a) yes; b) yes; c) yes

35) The margin of error of a confidence interval is 35) _____

A) $\frac{\sigma}{\sqrt{n}}$

B) $z_{\alpha/2}$

C) $\pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

D) \bar{x}