

Name _____

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

Solve the problem.

- 1) The standard error of the mean is given by

1) _____

- A) $\mu \pm \sigma$ B) $\frac{\sigma}{\sqrt{n}}$ C) $|\mu - \bar{x}|$ D) $\mu - \bar{x}$

- 2) Suppose a population has a mean weight of 180 pounds and a standard deviation of 25 pounds. A sample of 100 items is drawn from this population. What is the standard error of the mean?

2) _____

- A) 18.0 B) 1.8 C) 0.25 D) 2.5

Provide an appropriate response.

- 3) Which of the following sampling distributions of
- \bar{x}
- has the least amount of variability?

3) _____

- I) $\mu = 50, \sigma = 10, n = 100$
 II) $\mu = 50, \sigma = 10, n = 300$
 III) $\mu = 50, \sigma = 10, n = 30$

A) III

B) I

C) II

D) not enough information because the variability depends upon the shape of the population distribution

E) not enough information because the variability depends upon the shape of the sampling distribution

Solve the problem.

- 4) The number of violent crimes committed in a day possesses a distribution with a mean of 2.8 crimes per day and a standard deviation of 4 crimes per day. A random sample of 100 days was observed, and the sample mean number of crimes for the sample was calculated. Describe the sampling distribution of the sample mean.

4) _____

- A) approximately normal with mean = 2.8 and standard error = 4
 B) approximately normal with mean = 2.8 and standard error = 0.4
 C) shape unknown with mean = 2.8 and standard error = 4
 D) shape unknown with mean = 2.8 and standard error = 0.4

- 5) Which of the following is not a characteristic of Student's t distribution?

5) _____

- A) mean of 1
 B) depends on degrees of freedom.
 C) symmetric distribution
 D) For large samples, the t and z distributions are nearly equivalent.

- 6) To select the correct Student's t-distribution requires knowing the degrees of freedom. How many degrees of freedom are there for a sample of size n?

6) _____

- A) $n + 1$ B) $\frac{\bar{x} - \mu}{s/\sqrt{n}}$ C) $n - 1$ D) n

Provide an appropriate response.

7) Which of the following statements regarding t-distributions is/are true?

7) _____

- I. The total area under a t-distribution with 10 degrees of freedom is greater than the area under the standard normal curve.
- II. The t-distribution with 10 degrees of freedom is flatter and wider than the standard normal curve.
- III. The t-distribution with 10 degrees of freedom more closely resembles the standard normal curve than the t-distribution with 20 degrees of freedom.

A) III only B) both II and III C) II only D) I only

Solve the problem.

8) Find the critical t-value that corresponds to $c = 0.95$ and $n = 16$.

8) _____

A) 1.753 B) 2.947 C) 2.131 D) 2.602

Using the t-tables, software, or a calculator, report the t-score for the given confidence interval and degrees of freedom.

9) A 90% confidence interval from a sample of size 20.

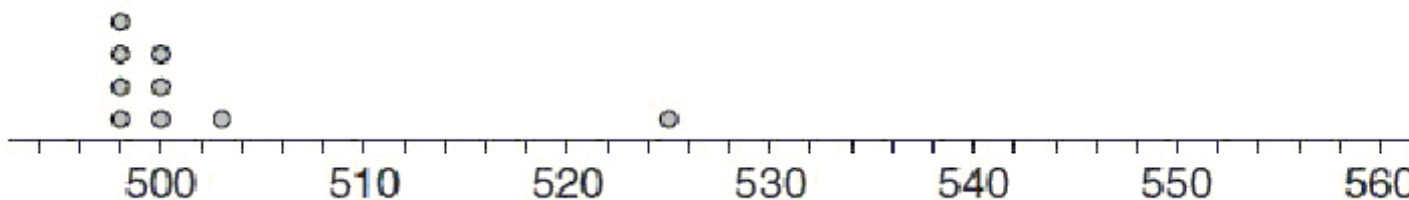
9) _____

A) 1.725 B) 1.729 C) 1.645 D) 1.734 E) 2.093

Provide an appropriate response.

10) A sample with size $n=10$ has $\bar{x}=508.5$, and $s=21.5$. The dotplot for this sample is given below.

10) _____



Indicate whether or not it is appropriate to use the t-distribution.

A) Yes B) No

11) A sample with size $n=12$ has $\bar{x}=7.6$ and $s=1.6$. The dotplot for this sample is given below

11) _____

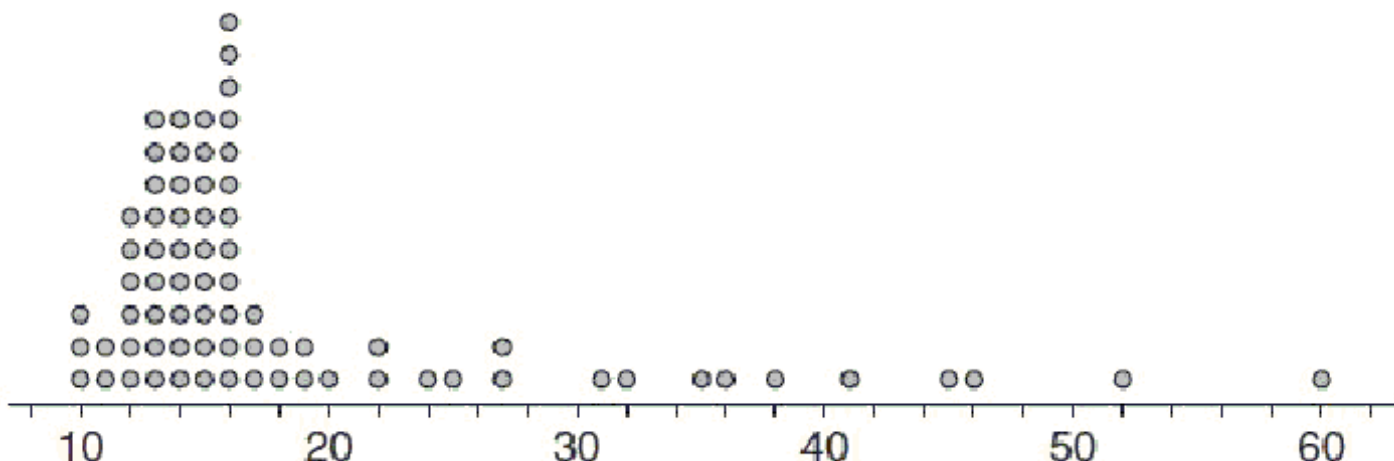


Indicate whether or not it is appropriate to use the t-distribution.

A) No B) Yes

12) A sample with size $n=75$ has $\bar{x}=18.92$, and $s=10.1$. The dotplot for this sample is given below.

12) _____



Indicate whether or not it is appropriate to use the t-distribution.

A) No

B) Yes

13) In stating a confidence-interval estimate of a population mean, the level of confidence increases as the size of the interval increases or decreases?

13) _____

A) increases

B) decreases

Solve the problem.

14) Construct a 95% confidence interval for the population mean, μ . Assume the population has a normal distribution. A sample of 20 college students had mean annual earnings of \$3120 with a standard deviation of \$677.

14) _____

A) (\$2135, \$2567)

B) (\$2803, \$3437)

C) (\$2657, \$2891)

D) (\$1324, \$1567)

15) 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.

15) _____

A) (2.37, 3.56)

B) (2.51, 3.21)

C) (2.41, 3.42)

D) (2.28, 3.66)

16) Construct a 99% confidence interval for the population mean, μ . Assume the population has a normal distribution. A group of 19 randomly selected students has a mean age of 22.4 years with a standard deviation of 3.8 years.

16) _____

A) (16.3, 26.9)

B) (19.9, 24.9)

C) (17.2, 23.6)

D) (18.7, 24.1)

Find the sample size

17) Scores on a certain test are normally distributed with a variance of 14. A researcher wishes to estimate the mean score achieved by all adults on the test. Find the sample size needed to assure with 98% confidence that the sample mean will not differ from the population mean by more than 2 units.

17) _____

A) 11

B) 20

C) 39

D) 400

E) 267

- 18) Weights of women in one age group are normally distributed with a standard deviation σ of 20 lb. A researcher wishes to estimate the mean weight of all women in this age group. Find how large a sample must be drawn in order to be 90% confident that the sample mean will not differ from the population mean by more than 3.5 lb. 18) _____
- A) 89 B) 86 C) 44 D) 126 E) 98

Interpret the confidence interval.

- 19) Data collected by child development scientists produced the following 90% confidence interval for the average age (in months) at which children say their first word: $10.4 < \mu < 13.8$. 19) _____
- A) We are 90% confident that a child will say his first word when he is between 10.4 and 13.8 months old.
 B) We are 90% confident that a child will say his first word when he is older than 10.4 months.
 C) 90% of the children in this sample said their first word when they were between 10.4 and 13.8 months old.
 D) We are 90% confident that the average age at which children in this sample said their first word was between 10.4 and 13.8 months.
 E) We are 90% confident that the mean age at which children say their first word is between 10.4 and 13.8 months.

Assume that a simple random sample has been selected from a normally distributed population. State the final conclusion.

- 20) Test the claim that the mean lifetime of a particular car engine is greater than 220,000 miles. Sample data are summarized as $n = 23$, $\bar{x} = 226,450$ miles, and $s = 11,500$ miles. Use a significance level of $\alpha = 0.01$. State the null and alternative hypotheses. 20) _____
- A) $H_0: \mu = 220,000$
 $H_a: \mu > 220,000$
 B) $H_0: \mu = 220,000$
 $H_a: \mu < 220,000$
 C) $H_0: \mu = 220,000$
 $H_a: \mu \neq 220,000$
 D) $H_0: \mu \neq 220,000$
 $H_a: \mu = 220,000$

- 21) Test the claim that the mean lifetime of a particular car engine is greater than 220,000 miles. Sample data are summarized as $n = 23$, $\bar{x} = 226,450$ miles, and $s = 11,500$ miles. Use a significance level of $\alpha = 0.01$. What is the test statistic? 21) _____
- A) $z = -2.69$ B) $t = 12.9$ C) $t = -2.69$ D) $t = 2.69$

- 22) Test the claim that the mean lifetime of a particular car engine is greater than 220,000 miles. Sample data are summarized as $n = 23$, $\bar{x} = 226,450$ miles, and $s = 11,500$ miles. Use a significance level of $\alpha = 0.01$. What is the p-value? 22) _____
- A) 0.0071 B) 0.0036 C) 0.0133 D) 0.0067

- 23) Test the claim that the mean lifetime of a particular car engine is greater than 220,000 miles. Sample data are summarized as $n = 23$, $\bar{x} = 226,450$ miles, and $s = 11,500$ miles. Use a significance level of $\alpha = 0.01$. State your conclusion about H_0 . 23) _____
- A) Reject H_0 and sufficient evidence to support the claim that mean lifetime of a particular car engine is greater than 220,000 miles.
 - B) Do not Reject H_0 and insufficient evidence to support the claim that mean lifetime of a particular car engine is greater than 220,000 miles.
 - C) Do not Reject H_0 and sufficient evidence to support the claim that mean lifetime of a particular car engine is greater than 220,000 miles.
 - D) Reject H_0 and insufficient evidence to support the claim that mean lifetime of a particular car engine is greater than 220,000 miles.
- 24) Test the claim that for the population of female college students at a particular university, the mean weight is given by $\mu = 132$ lb. Sample data are summarized as $n = 20$, $\bar{x} = 137$ lb, and $s = 14.2$ lb. Use a significance level of $\alpha = 0.1$.
 $H_0: \mu = 132$ $H_a: \mu \neq 132$
 State your conclusion about H_0 . 24) _____
- A) $t = 1.57$, do not reject H_0
 - B) $t = 7.04$, reject H_0
 - C) $z = 1.57$, do not reject H_0
 - D) $t = 1.57$, reject H_0
 - E) $t = -1.57$, do not reject H_0
- 25) Test the claim that the mean age of the prison population at a certain facility is less than 26 years. Sample data are summarized as $n = 25$, $\bar{x} = 24.4$ years, and $s = 9.2$ years. Use a significance level of $\alpha = 0.05$.
 $H_0: \mu = 26$ $H_a: \mu < 26$
 State your conclusion about H_0 . 25) _____
- A) $t = -2.69$, reject H_0
 - B) $z = -2.69$, reject H_0
 - C) $t = 0.87$, do not reject H_0
 - D) $t = -0.87$, do not reject H_0 .
 - E) $t = 12.9$, reject H_0