



1. The set of all elements of interest in a study is _____.
 - a. set notation
 - b. a set of interest
 - c. a sample
 - d. a population

2. A subset of a population selected to represent the population is a _____.
 - a. subset
 - b. sample
 - c. small population
 - d. None of the answers is correct.

3. The sample mean is the point estimator of _____.
 - a. μ
 - b. σ
 - c. x
 - d. p

4. The probability distribution of all possible values of the sample mean is called the _____.
 - a. central probability distribution
 - b. sampling distribution of the sample mean
 - c. random variation
 - d. standard error

5. A theorem that allows us to use the normal probability distribution to approximate the sampling distribution of sample means and sample proportions whenever the sample size is large is known as the _____.
 - a. approximation theorem
 - b. normal probability theorem
 - c. central limit theorem
 - d. central normality theorem

6. A population has a mean of 53 and a standard deviation of 21. A sample of 49 observations will be taken. The probability that the sample mean will be greater than 57.95 is _____.
 - a. 0
 - b. .0495
 - c. .4505
 - d. None of the answers is correct.

Exhibit 7-4

A random sample of 121 bottles of cologne showed an average content of 4 ounces. It is known that the standard deviation of the contents (i.e., of the population) is 0.22 ounces.

7. Refer to Exhibit 7-4. The point estimate of the mean content of all bottles is -----.
- .22
 - 4
 - 121
 - .02

8. As a general rule, the sampling distribution of the sample proportions can be approximated by a normal probability distribution whenever -----.

- $np \geq 5$
- $n(1 - p) \geq 5$
- $n \geq 30$
- $np \geq 5$ and $n(1 - p) \geq 5$

9. A simple random sample of 8 employees of a corporation provided the following information:

Employee	1	2	3	4	5	6	7	8
Age	25	32	26	40	50	54	22	23
Gender	M	M	M	M	F	M	M	F

- Determine the point estimate for the average age of all employees.
- What is the point estimate for the standard deviation of the population?
- Determine a point estimate for the proportion of all employees who are female.

10. MNM Corporation gives each of its employees an aptitude test. The scores on the test are normally distributed with a mean of 75 and a standard deviation of 15. A simple random sample of 25 is taken from a population of 500.

- What are the expected value, the standard deviation, and the shape of the sampling distribution of \bar{x} ?
- What is the random variable in this problem? Define it in words.
- What is the probability that the average aptitude test score in the sample will be between 70.14 and 82.14?
- What is the probability that the average aptitude test score in the sample will be greater than 82.68?
- What is the probability that the average aptitude test score in the sample will be less than 78.69?
- Find a value, C, such that $P(\bar{x} \geq C) = .015$.

11. To compute the minimum sample size for an interval estimate of μ when the population standard deviation is known, we must first determine all of the following EXCEPT -----.

- desired margin of error
- confidence level
- population standard deviation
- degrees of freedom

12. When the level of confidence increases, the confidence interval -----.

- stays the same
- becomes wider

- c. becomes narrower
- d. cannot be determined from the information given

13. In determining the sample size necessary to estimate a population proportion, which of the following is NOT needed?

- a. the maximum margin of error that can be tolerated
- b. the confidence level required
- c. a preliminary estimate of the true population proportion p
- d. the mean of the population

14. A small stock brokerage firm wants to determine the average daily sales (in dollars) of stocks to their clients. A sample of the sales for 36 days revealed average daily sales of \$200,000. Assume that the standard deviation of the population is known to be \$18,000.

- a. Provide a 95% confidence interval estimate for the average daily sale.
- b. Provide a 97% confidence interval estimate for the average daily sale.

15. The standard deviation for the lifetimes of washing machines is estimated to be 800 hours. What sample size must be selected in order to be 97% confident that the margin of error will not exceed 50 hours?

16. A local hotel wants to estimate the proportion of its guests that are from out of state. Preliminary estimates are that 45% of the hotel guests are from out-of-state. What sample size should be selected to estimate the proportion of out of state guests with a margin of error no larger than 5% and with a 95% level of confidence?

17. The probability that the interval estimation procedure will generate an interval that contains the actual value of the population parameter being estimated is the _____.

- a. level of significance
- b. confidence level
- c. confidence coefficient
- d. error factor

Exhibit 8-2

The manager of a grocery store has selected a random sample of 100 customers. The average length of time it took these 100 customers to check out was 3.0 minutes. It is known that the standard deviation of the checkout time is 1 minute.

18. Refer to Exhibit 8-2. With a .95 probability, the sample mean will provide a margin of error of _____.

- a. .95
- b. .10
- c. .196
- d. 1.96

19. The degrees of freedom associated with a t distribution are a function of the _____.

- a. area in the upper tail
- b. sample standard deviation

- c. confidence coefficient
- d. sample size

20. A random sample of 49 lunch customers was selected at a restaurant. The average amount of time the customers in the sample stayed in the restaurant was 33 minutes. From past experience, it is known that the population standard deviation equals 10 minutes.

- a. Compute the standard error of the mean.
- b. What can be said about the sampling distribution for the average amount of time customers spent in the restaurant? Be sure to explain your answer.
- c. With a .95 probability, what statement can be made about the size of the margin of error?
- d. Construct a 95% confidence interval for the true average amount of time customers spent in the restaurant.
- e. With a .95 probability, what sample size would have to be selected to provide a margin of error of 2.5 minutes or less?

21. A statistician selected a sample of 16 accounts receivable and determined the mean of the sample to be \$5,000 with a standard deviation of \$400. She reported that the sample information indicated the mean of the population ranges from \$4,739.80 to \$5,260.20. She did not report what confidence coefficient she had used. Based on the above information, determine the confidence coefficient that was used.

22. Fifty students are enrolled in an Economics class. After the first examination, a random sample of five papers was selected. The grades were 60, 75, 80, 70, and 90.

- a. Calculate the estimate of the standard error of the mean.
- b. What assumption must be made before we can determine an interval for the mean grade of all the students in the class? Explain why.
- c. Assume the assumption of part (b) is met. Provide a 90% confidence interval for the mean grade of all the students in the class.
- d. If there were 200 students in the class, what would be the 90% confidence interval for the mean grade of all the students in the class?

23. A health club annually surveys its members. Last year, 33% of the members said they use the treadmill at least four times a week. How large a sample should be selected this year to estimate the percentage of members who use the treadmill at least four times a week? The estimate is desired to have a margin of error of 5% with a 95% level of confidence.

24. As a general guideline, the research hypothesis should be stated as the _____.

- a. null hypothesis
- b. alternative hypothesis
- c. tentative assumption
- d. hypothesis the researcher wants to disprove

25. The manager of an automobile dealership is considering a new bonus plan in order to increase sales. Currently, the mean sales rate per salesperson is five automobiles per month. The correct set of hypotheses for testing the effect of the bonus plan is _____.

- a. $H_0: \mu < 5$ $H_a: \mu \leq 5$
- b. $H_0: \mu \leq 5$ $H_a: \mu > 5$

- c. $H_0: \mu > 5$ $H_a: \mu \leq 5$
- d. $H_0: \mu \geq 5$ $H_a: \mu < 5$

26. The level of significance in hypothesis testing is the probability of -----.

- a. accepting a true null hypothesis
- b. accepting a false null hypothesis
- c. rejecting a true null hypothesis
- d. accepting a true null hypothesis, accepting a false null hypothesis, or rejecting a true null hypothesis, depending on the situation

27. When the hypotheses $H_0: \mu \geq 100$ and $H_a: \mu < 100$ are being tested at a level of significance of α , the null hypothesis will be rejected if the test statistic z is -----.

- a. $> z_\alpha$
- b. $> -z_\alpha$
- c. $< -z_\alpha$
- d. < 100

28. A p-value is the -----.

- a. probability, when the null hypothesis is true, of obtaining a sample result that is at least as unlikely as what is observed
- b. value of the test statistic
- c. probability of a Type II error
- d. probability corresponding to the critical value(s) in a hypothesis test

29. The average gasoline price of one of the major oil companies has been \$1.00 per gallon. Because of shortages in production of crude oil, it is believed that there has been a significant INCREASE in the average price. In order to test this belief, we randomly selected a sample of 36 of the company's gas stations and determined that the average price for the stations in the sample was \$1.10. Assume that the standard deviation of the population (σ) is \$0.12.

- a. State the null and alternative hypotheses.
- b. Test the claim at $\alpha = .05$.
- c. What is the p-value associated with the above sample results?