Test Bank

# Chapter 6: Hypothesis Testing With *z* Scores

## Multiple Choice

1. The *z* for a sample mean hypothesis test compares a sample mean to another mean. In these situations, the goal of hypothesis testing is to:

A. determine if the distribution of sample means is normally distributed.

B. determine if the observed difference between the means is likely or unlikely to be due to sampling error.

C. quantify the size of the difference between the means.

D. identify a range of plausible values for a population parameter.

E. prove that the null hypothesis is true.

Ans: B

Learning Objective: Purpose of hypothesis testing

2. In addition to hypothesis testing, researchers compute effect sizes when comparing sample means. Why do researchers compute effect sizes?

A. determine if the distribution of sample means is normally distributed

B. determine if the observed difference between the means is likely or unlikely to be due to sampling error

C. quantify the size of the difference between the means

D. identify a range of plausible values for a population parameter

E. prove that the null hypothesis is true

Ans: C

Learning Objective: Purpose of effect sizes

3. Which of the following accurately describes the critical region?

A. Sample means that are possible, but not likely if the null hypothesis is true.

B. Sample means that are impossible if the null hypothesis is true.

C. Sample means that are possible, but not likely if the null hypothesis is false.

D. Sample means that are impossible if the null hypothesis is false.

Ans: A

Learning Objective: Critical region

4. What should you conclude if you obtain a *z* score that is in the critical region?

A. reject the null and conclude that the sample mean is significantly different from the population mean

B. reject the null and conclude that the sample mean is NOT significantly different from the population mean

C. fail to reject the null and conclude that the sample mean is significantly different from the population mean

D. fail to reject the null and conclude that the sample mean is NOT significantly different from the population mean

Ans: A

Learning Objective: Rejecting null

5. A researcher performed a statistical test with an α value of .05. The obtained *z* score had a *p* value of *p* = .02. Should the researcher reject or fail to reject the null hypothesis?

A. reject

B. fail to reject

Ans: A

Learning Objective: Rejecting null

6. A researcher performed a statistical test with an α value of .05. The obtained *z* score had a *p* value of *p* = .02. What is probability that this research made a Type II error?

A. .05

B. .02

C. 0

Ans: C

Learning Objective: Type II error

7. A researcher performed a statistical test with an α value of .05. The obtained *z* score had a *p* value of *p* = .02. What is probability that this research made a Type I error?

A. .05

B. .02

C. 0

Ans: A

Learning Objective: Type I error

8. A researcher computes a *z* score of 2.06 and obtains a *p* value of .02. Which of the following is the best interpretation of that *p* value?

A. .02 is the amount of statistical power in the study

B. .02 is the probability of making a Type II error

C. .02 is the probability of obtaining a *z* score of 2.06 or larger if the null hypothesis is true

D. .02 is the probability of correctly rejecting the research hypothesis

Ans: C

Learning Objective: *p* Value

9. With a *p* value of .04 and an α of .05, should you reject or fail to reject the null hypothesis?

A. reject

B. fail to reject

Ans: A

Learning Objective: Rejecting null

10. With a *p* value of .10 and an α of .05, should you reject or fail to reject the null hypothesis?

A. reject

B. fail to reject

Ans: B

Learning Objective: Rejecting null

11. With an obtained *z* score 1.78, an α of .05, and a critical value of 1.65 should you reject or fail to reject the null hypothesis?

A. reject

B. fail to reject

Ans: A

Learning Objective: Rejecting null

12. With an obtained *z* score 1.52 and an α of .05 should you reject or fail to reject the null hypothesis?

A. reject

B. fail to reject

Ans: B

Learning Objective: Rejecting null

13. An Organizational Psychologist wants to know if attending a training session increases the productivity of workers. The Organizational Psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The Organizational Psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was M = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. The fact that the sample size in the study was *N* = 100 helped researchers meet which of the following statistical assumptions?A. independence of data

B. normal distribution of sample means

C. appropriate measurement of the IV and DV

D. homogeneity of variance

Ans: B

Learning Objective: Assumptions

14. An Organizational Psychologist wants to know if attending a training session increases the productivity of workers. The organizational psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The organizational psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was *M* = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. Choose the correct the null hypothesis for this study.

A. µ < 66

B. µ ≤ 66

C. µ < 68

D. µ ≤ 68

Ans: B

Learning Objective: Hypotheses

15. An organizational psychologist wants to know if attending a training session increases the productivity of workers. The organizational psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The organizational psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was *M* = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. Choose the correct the research hypothesis for this study.

A. µ > 66

B. µ ≥ 66

C. µ > 68

D. µ ≥ 68

Ans: A

Learning Objective: Hypotheses

16. An organizational psychologist wants to know if attending a training session increases the productivity of workers. The organizational psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The organizational psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was *M* = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. What *sample mean* should you expect if the null hypothesis is true?

A. 66

B. 68

C. 1.65

D. 1.96

E. 1

F. 0

Ans: A

Learning Objective: Hypothesis testing logic

17. An organizational psychologist wants to know if attending a training session increases the productivity of workers. The organizational psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The organizational psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was M = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. What *z score* should you expect if the null hypothesis is true?

A. 66

B. 68

C. 1.65

D. 1.96

E. 1

F. 0

Ans: F

Learning Objective: Hypothesis testing logic

18. An organizational psychologist wants to know if attending a training session increases the productivity of workers. The organizational psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The organizational psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was *M* = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. What is the *z* score that defines the critical region for this study?

A. 66

B. 68

C. 1.65

D. 1.96

E. 1

F. 0

Ans: C

Learning Objective: *z* Score critical region

19. An organizational psychologist wants to know if attending a training session increases the productivity of workers. The organizational psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The organizational psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was *M* = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. The sample of 100 workers had a mean productivity of 68. Compute the *z* for this sample mean. *Show your work on the worksheet*.

A. 1.67

B. 1.2

C. 0.17

D. 0.02

E. 1.65

Ans: A

Learning Objective: Computing *z* for sample mean

20. An organizational psychologist wants to know if attending a training session increases the productivity of workers. The organizational psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The organizational psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was *M* = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. Compute the effect size for this study. *Show your work on the worksheet*.

A. 1.67

B. 1.2

C. .17

D. .02

E. 1.65

Ans: C

Learning Objective: Computing effect size

21. An organizational psychologist wants to know if attending a training session increases the productivity of workers. The organizational psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The organizational psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was *M* = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. Describe the effect size as small, small-medium, and so on.

A. small

B. small–medium

C. medium

D. medium–large

E. large

Ans: A

Learning Objective: Interpreting effect size

22. An organizational psychologist wants to know if attending a training session increases the productivity of workers. The organizational psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The organizational psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was *M* = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. Determine if you should reject the null or fail to reject the null.

A. reject H0

B. fail to reject H0

Ans: A

Learning Objective: Rejecting the null

23. An organizational psychologist wants to know if attending a training session increases the productivity of workers. The organizational psychologist knows that the mean productivity of workers in the population of workers is 66 with a standard deviation of 12. The organizational psychologist took a sample of 100 workers and gave them all the training session. After training, the mean productivity was *M* = 68. She then compared the mean productivity of the sample workers to the mean for the population. Use α = .05. Did the training session work to increase productivity?

A. Yes

B. No

Ans: A

Learning Objective: Interpreting results

24. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. What sample mean should you expect if the null hypothesis is true?

A. 69

B. 75

C. 50

D. 11

Ans: A

Learning Objective: Hypothesis testing logic

25. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. The fact that the population of scores on the exam were normally distributed suggests that which assumption was probably met?

A. appropriate measurement of the IV and DV

B. homogeneity of variance

C. independence

D. normality

Ans: D

Learning Objective: Assumptions

26. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. The fact that the standard deviation of the sample was 10.8 and the standard deviation of the population was 11 suggests that which assumption was probably met?

A. appropriate measurement of the IV and DV

B. homogeneity of variance

C. independence

D. normality

Ans: B

Learning Objective: Assumptions

27. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. The fact that the IV in this study is a grouping variable that identifies that the sample of students in the honors class is different from the general population and the test scores are measured on an interval/ratio scale suggests that which assumption was probably met?

A. appropriate measurement of the IV and DV

B. homogeneity of variance

C. independence

D. normality

Ans: A

Learning Objective: Assumptions

28. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. The fact that all students in the class took the test under controlled conditions (e.g., they completed the test independently) suggests that which assumption was probably met?

A. appropriate measurement of the IV and DV

B. homogeneity of variance

C. independence

D. normality

Ans: C

Learning Objective: Assumptions

29. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. Identify the null and research hypotheses for this study.

A. H0:µHSC ≤ 75; H1: µHSC > 75

B. H0:µHSC < 75; H1: µHSC ≥ 75

C. H0:µHSC ≤ 69; H1: µHSC > 69

D. H0:µHSC < 69; H1: µHSC ≥ 69

E. H0:µHSC ≥75; H1: µHSC < 75

F. H0:µHSC > 75; H1: µHSC ≤ 75

G. H0:µHSC ≥ 69; H1: µHSC < 69

H. H0:µHSC > 69; H1: µHSC ≤ 69

Ans: C

Learning Objective: Hypotheses

30. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. Identify the null hypotheses for this study.

A. The honor students’ scores will not be higher than the national average

B. The honor students’ scores will be higher than the national average

C. The honor students’ scores will not be higher than the national average

D. The honor students’ scores will be higher than the national average

Ans: A

Learning Objective: Hypotheses

31. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. Identify the research hypotheses for this study.

A. the honor students’ scores will not be higher than the national average

B. the honor students’ scores will be higher than the national average

C. the honor students’ scores will not be higher than the national average

D. the honor students’ scores will be higher than the national average

Ans: D

Learning Objective: Hypotheses

32. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. What *z score* should you expect if the null hypothesis is true?

A. 0

B. +1

C. +1.65

D. −1

Ans: A

Learning Objective: Hypothesis testing logic

33. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. What is the *z score* that defines the critical region for this study?

A. 0

B. +1

C. +1.65

D. −1

Ans: A

Learning Objective: Critical region

34. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. What is the obtained *z* score for this study?

A. 1.65

B. 2.31

C. 0.55

D. 1.41

Ans: B

Learning Objective: Computing z for sample mean

35. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. What is the *p* value (i.e., probability) of getting the above obtained *z*, if the null is true?

A. .07

B. .01

C. .03

D. .05

Ans: B

Learning Objective: Finding *p* value

36. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. Determine if you should reject the null or fail to reject the null.

A. reject

B. fail to reject

Ans: A

Learning Objective: Rejecting null

37. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. Compute the effect size for this study.

A. 2.31

B. 0.54

C. 0.25

D. 0.18

Ans: B

Learning Objective: Computing effect size

38. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. How large is the effect size?

A. small

B. small–medium

C. medium

D. medium–large

E. large

Ans: C

Learning Objective: Interpreting effect size

39. An honors statistics instructor wanted to know if the mean performance of his 18 students was significantly better than the national average score. The *mean score* of the 18 students in his statistics class was 75. The national mean (i.e., µ) and standard deviation (i.e., σ) for the Statistics test was 69 and 11, respectively. Use α = .05. Which of the following is the best summary of the results of this study?

A. The mean performance of the students in the honors statistics class (*M* = 75) was significantly better than the national mean.

B. The mean performance of the students in the honors statistics class (*M* = 75) was *not* significantly better than the national mean.

C. There was a significant difference between the mean performance of the honors statistics class (*M* = 75) and the national mean.

D. There was *not* a significant difference between the mean performance of the honors statistics class (*M* = 75) and the national mean.

Ans: A

Learning Objective: Summarizing test results

40. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one-tailed. What are the one-tailed null and research hypotheses for this study?

A. H0: µ = 50, H1: µ ≠ 50

B. H0: µ < 50, H1: µ ≥ 50

C. H0: µ ≤ 50, H1: µ > 50

D. H0: µ = 50, H1: µ >50

Ans: C

Learning Objective: Hypotheses

41. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one-tailed. What sample mean should you expect if the null hypothesis is true?

A. 0

B. 1

C. 50

D. 52

Ans: C

Learning Objective: Hypothesis testing logic

42. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one-tailed. What *z* score should you expect if the null hypothesis is true?

A. 0

B. 1

C. 50

D. 52

Ans: A

Learning Objective: Hypothesis testing logic

43. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one-tailed. What is the *z* score that defines the critical region for this study? Use α = .05, one-tailed.

A. .5199

B. .4801

C. 1.65

D. 1.96

Ans: C

Learning Objective: Critical region

44. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one tailed. Compute the *z* for this sample mean.

A. .03

B. .21

C. 1.2

D. 2.08

Ans: D

Learning Objective: Computing z for sample mean

45. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis, he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one tailed. Should you reject or fail to reject the null?

A. reject

B. fail to reject

Ans: A

Learning Objective: Rejecting null

46. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one tailed. Compute the effect size for this study.

A. .03

B. .21

C. 1.2

D. 2.08

Ans: B

Learning Objective: Computing effect size

47. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one tailed.

Describe the size of the effect.

A. small

B. medium

C. large

Ans: A

Learning Objective: Interpreting effect size

48. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one tailed. Which of the following statements best summarize the results of this study?

A. People in small towns were not friendlier than the general population.

B. People in small towns were friendlier than the general population.

C. People in small towns were less friendly than the general population.

Ans: B

Learning Objective: Summarizing test results

49. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one tailed. Which of the following statements describes a Type I error in the context of this study?

A. concluding that people in small towns are friendlier than the general population when they are not friendlier

B. concluding that people in small towns are not friendlier than the general population when they are not friendlier

C. concluding that people in small towns are friendlier than the general population when they are friendlier

D. concluding that people in small towns are not friendlier than the general population when they are friendlier

Ans: A

Learning Objective: Type I error

50. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one tailed. Which of the following statements describes a Type II error in the context of this study?

A. concluding that people in small towns are friendlier than the general population when they are not friendlier

B. concluding that people in small towns are not friendlier than the general population when they are not friendlier

C. concluding that people in small towns are friendlier than the general population when they are friendlier

D. concluding that people in small towns are not friendlier than the general population when they are friendlier

Ans: D

Learning Objective: Type II error

51. A student wonders if people from small towns are friendlier than the general population. To test this hypothesis, he gives 100 people a friendliness survey. The population mean for this survey is 50 with a standard deviation of 12. The mean for his sample is 52.5. Compute a *z* for a sample mean to determine if his hypothesis was supported. Use α = .05, one tailed. Which of the following statements describes statistical power in the context of this study?

A. concluding that people in small towns are friendlier than the general population when they are not friendlier

B. concluding that people in small towns are not friendlier than the general population when they are not friendlier

C. concluding that people in small towns are friendlier than the general population when they are friendlier

D. concluding that people in small towns are not friendlier than the general population when they are friendlier

Ans: C

Learning Objective: Statistical power

52. Why do careful researchers conduct a hypothesis test *and* also compute an effect size? What distinctive information do researchers get from each statistical procedure?

A. Significance testing tells researchers if the treatment is likely to be effective; effect sizes tell researchers how effective the treatment is likely to be.

B. Significance testing tells researchers if they made a Type I error or a Type II error; effect sizes tell researchers how much statistical power their study had.

C. Hypothesis testing tells researchers how they can decrease sampling error; effect sizes tell researchers how to increase statistical power.

Ans:

Learning Objective: Hypothesis testing logic

53. What is the purpose of a significance test (also called hypothesis test)? Select all that apply.

A. to determine how much of an effect the IV had on the DV

B. to quantify the size of the difference between the sample mean and the population mean

C. to determine if sample mean is a likely or unlikely outcome due to sampling error

Ans: C

Learning Objective: Hypothesis testing logic

54. What is the purpose of an effect size estimate? Select all that apply.

A. to determine if sample mean is significantly different than a population mean

B. to determine how much of an effect the IV had on the DV

C. to determine if sample mean is a likely or unlikely outcome due to sampling error

Ans: B

Learning Objective: Effect size purpose

55. Your consulting firm needs to offer advice to a CEO who is considering a new training program for entry level employees. If the program works it should increase the new employees’ job satisfaction. Ten new employees were put through the new training program and 10 new employees did not get the new program. After 1 year on the job, both groups of employees were asked to complete a survey measuring their job satisfaction. The statistical analysis of the results showed the mean job satisfaction for the trained employees was not significantly higher than the mean satisfaction for the untrained employees, *t* (18) = 1.69, *p* >.05 (one tailed), *d* = .61. Which of the following pieces of advice should your firm offer the CEO?

A. Start using this new program immediately, it is obviously working based on the effect size.

B. The difference might be due to sampling error but the effect size suggests the firm should collect more data before they make a final determination on the viability of the program.

C. Stop using the program immediately, given that the two groups did not differ in their respective job satisfactions clearly indicates that the new program is not working.

Ans: B

Learning Objective: Interpreting test results

56. A researcher tests the effectiveness of an antianxiety drug by recruiting 500 participants and randomly assigning half of the participants to take Drug A for 1 month and the other half to take a placebo for 1 month. At the end of the month, anxiety levels are recorded. Overall, participants who received Drug A had anxiety scores of *M* =32.12, *SD* = 10.58 and those you received the placebo had anxiety scores of *M* = 34.29. *SD* = 11.10, *t*(498) = 2.17, *p* = .01 (one tailed), *d* = .19. Faced with these data, the researcher needs to write a report in which she interprets the data. Which of the following is the best summary of these data?

A. The results of the *t*-test are statistically significant, indicating that the drug is much more effective than the placebo.

B. The results of the *t*-test are significant, but the effect size is small. This study should be replicated with a larger sample size to increase statistical power.

C. The results of the *t*-test are significant, but the effect size is small. The drug does lower anxiety, but it is not clear if the reduction is enough to warrant use of the drug.

D. The small *p* value and the small effect size suggest that the observed difference between the drug and placebo groups are likely to be due to sampling error. This study should be replicated with a larger sample size.

E. The *p* value is very low, showing that there is only a 1% chance of a Type I error. We can be 99% confident that the drug significantly reduces anxiety.

Ans: C

Learning Objective: Interpreting test results

57. In a research study, 100 college students took a personal finances class and 100 students took a personal health class (as a control condition). Two years later all participants completed a survey about their personal finances. A higher score on the survey indicated greater financial health. The mean financial health of the students who took the finance class was *M* = 29.7, *SD* = 7.8, while the mean for the other students was *M* = 28.8, *SD* = 9.1). The statistical information was *t*(198) = .75, *p* = .23, *d* =.11. Based on these results, which of the following is the best recommendation?

A. Start making all students take a personal finance class. The data clearly indicate that it is helping to improve students’ financial health 2 years later.

B. Collect more data, you need a larger sample size before you can determine if this intervention works or not.

C. These data suggest that the intervention is not worth pursuing any further. Start considering how you might revise the intervention to make it more effective.

Ans: C

Learning Objective: Interpreting test results

58. Which of the following statements describes a Type I error?

A. concluding that the treatment did not improve test scores when it did improve test scores

B. concluding that the treatment did not improve test scores when it did not

C. concluding that the treatment improved test scores when it did not

D. concluding that the treatment improved test scores when it did improve test scores

Ans: C

Learning Objective: Type I error

59. Which of the following statements describes a Type II error?

A. concluding that the treatment did not improve test scores when it did improve test scores

B. concluding that the treatment did not improve test scores when it did not

C. concluding that the treatment improved test scores when it did not

D. concluding that the treatment improved test scores when it did improve test scores

Ans: A

Learning Objective: Type II error

60. Which of the following statements describes statistical power?

A. concluding that the treatment did not improve test scores when it did improve test scores

B. concluding that the treatment did not improve test scores when it did not

C. concluding that the treatment improved test scores when it did not

D. concluding that the treatment improved test scores when it did improve test scores

Ans: D

Learning Objective: Statistical power

61. A student is planning to conduct a study on the effects of exercise on mood. She decides to use a survey to measure mood and this survey has a mean of µ = 50 with a standard deviation of σ = 12. She plans to recruit 18 people who have not exercised in the past 6 months to participate in her study. All participants will exercise for 20 min, four times a week, for 1 month. At the end of the month, all participants will complete the mood measure. She plans to compute a *z* for a sample mean and use an α of .01 to interpret her results. After designing this study, the student shows her plan to her advisor and her advisor is concerned that the study will not have sufficient statistical power. Which of the following things could this student do to increase the power of the study?

A. increase the sample size

B. decrease the sample size

Ans: A

Learning Objective: Statistical power

62. A student is planning to conduct a study on the effects of exercise on mood. She decides to use a survey to measure mood and this survey has a mean of µ = 50 with a standard deviation of σ = 12. She plans to recruit 18 people who have not exercised in the past 6 months to participate in her study. All participants will exercise for 20 min, 4 times a week, for 1 month. At the end of the month, all participants will complete the mood measure. She plans to compute a *z* for a sample mean and use an α of .01 to interpret her results. After designing this study, the student shows her plan to her advisor and her advisor is concerned that the study will not have sufficient statistical power. Which of the following things could this student do to increase the power of the study?

A. Have people exercise for 30 min a day.

B. Have people exercise for 10 min a day.

Ans: A

Learning Objective: Statistical power

63. A student is planning to conduct a study on the effects of exercise on mood. She decides to use a survey to measure mood and this survey has a mean of µ = 50 with a standard deviation of σ = 12. She plans to recruit 18 people who have not exercised in the past 6 months to participate in her study. All participants will exercise for 20 min, 4 times a week, for 1 month. At the end of the month, all participants will complete the mood measure. She plans to compute a *z* for a sample mean and use an α of .01 to interpret her results. After designing this study, the student shows her plan to her advisor and her advisor is concerned that the study will not have sufficient statistical power. Which of the following things could this student do to increase the power of the study?

A. Change α from .01 to .05.

B. Change α from .01 to .001.

Ans: A

Learning Objective: Statistical power

64. If you change the *α level from .01 to .05* does the probability of making a *Type I* error increase, decrease or stay the same?

A. increase

B. decrease

C. stay the same

Ans: A

Learning Objective: Type I error

65. If you change the *α level from .01 to .05* does the probability of making a *Type II* error increase, decrease or stay the same?

A. increase

B. decrease

C. stay the same

Ans: B

Learning Objective: Type II error

66. If you change the *α level from .01 to .05* does *statistical power* increase, decrease or stay the same?

A. increase

B. decrease

C. stay the same

Ans: A

Learning Objective: Statistical power

67. If you change the *sample size from N = 10 to N = 50*does the probability of making a *Type I error* increase, decrease, or stay the same?

A. increase

B. decrease

C. stay the same

Ans: C

Learning Objective: Type I error

68. If you change the *sample size from N = 10 to N = 50* does the probability of making a *Type II error* increase, decrease, or stay the same?

A. increase

B. decrease

C. stay the same

Ans: B

Learning Objective: Type II error

69. If you change the *sample size from N = 10 to N = 50* does *statistical power* increase, decrease, or stay the same?

A. increase

B. decrease

C. stay the same

Ans: A

Learning Objective: Statistical power

70. If you *increase the size of the treatment effect,* does the probability of making a *Type I error* increase, decrease, or stay the same?

A. increase

B. decrease

C. stay the same

Ans: C

Learning Objective: Type I error

71. If you *increase the size of the treatment effect,* does the probability of making a *Type II error* increase, decrease, or stay the same?

A. increase

B. decrease

C. stay the same

Ans: B

Learning Objective: Type II error

72. If you *increase the size of the treatment effect,* does *statistical power* increase, decrease, or stay the same?

A. increase

B. decrease

C. stay the same

Ans: A

Learning Objective: Statistical power

73. To quantify the discrepancy between sample statistics and population parameters, researchers compute:

A. the standard error of the mean.

B. the standard deviation of the population of scores.

C. the sum of the squared deviations.

D. the mean of the distribution of sample means.

Ans: A

Learning Objective: Standard error of the mean

74. Researchers want the discrepancy between the sample statistic and population parameters to be as small as possible. How can they accomplish this goal?

A. use a small α value (e.g., .01 rather than .05)

B. use a large sample size.

C. use a large treatment effect

D. use as many populations as possible

Ans: B

Learning Objective: Reducing sampling error

75. Boeing is considering designing a new seat for passengers on its new airliner. The seat must be able to accommodate the middle 95% of the adult population. If the mean adult “behind” size is µ = 15.8 inches and standard deviation σ = 0.7 inches. Which statistic would you use to determine the minimum and maximum behind sizes that the new airliner seat must fit?

A. *z* for a single score

B. *z* for a sample mean

Ans: A

Learning Objective: Choosing statistic

76. A consumer survey indicates that the average household spends μ = US$155 on groceries each week. The distribution of spending amounts is approximately normal with a standard deviation of σ = US$25. What statistic would you use to determine, what proportion of the population spends more than US$150 a week on groceries?

A. *z* for a single score

B. *z* for a sample mean

Learning Objective: Choosing statistic

77. A researcher theorizes that first-born children are more intelligent than other children. A sample of 50 first-born children is found to have an average IQ of 105. The average IQ in the general population is 100 with a standard deviation of 15. Which statistic would you use to determine if first-born children significantly more intelligent than the general population?

A. *z* for a single score

B. *z* for a sample mean

Ans: B

Learning Objective: Choosing statistic

78. A group of teachers want to see if any students are struggling with reading so they give the students a standardized reading test. Scores on the test are normally distributed and have a mean of 86 and a standard deviation of 8. Students who score below 80 are put in a tutoring group. Which statistic should you use to determine which students should be put in a tutoring group?

A. *z* for a single score

B. *z* for a sample mean

Ans: A

Learning Objective: Choosing statistic

79. A baby carrier manufacturer comes out with a new carrier that is safest for babies that are 30 inches long and longer. If the average length of babies is 28 inches with a standard deviation of 2, what percentage of babies fall outside of the safe range to be able to use this seat? Which statistic should you use to determine the percentage of babies that are outside of the safe range?

A. *z* for a single score

B. *z* for a sample mean

Ans: A

Learning Objective: Choosing statistic

80. A football coach wants to identify players who need help with technique. He sets up a course to measure their technique. The score is normally distributed and have a mean of 6 and a standard deviation of 3. Those who score below 5 are given extra coaching and drills at the end of practice. What percentage of players would you expect to receive scores at or below 5. Which statistic should you use to determine the percentage of players with scores at or below 5?

A. *z* for a single score

B. *z* for a sample mean

Ans: A

Learning Objective: Choosing statistic

81. The average student studies 25 hr a week with a standard deviation of 2.5. A professor took a sample of 25 students and gave them special training designed to increase their hours of studying. After the special training was complete, the 25 workers studied 27.5 units every hr. What is the probability of randomly sampling 25 students from the general population and their mean study hours being 27.5 or higher? Which statistic should you use to determine the probability of obtaining a sample mean of 27.5 or higher?

A. *z* for a single score

B. *z* for a sample mean

Ans: B

Learning Objective: Choosing statistic

82. During WWII, plants needed to maximize output for war production. The average number of units produced in an arms manufacturing plant was 25 units per hour with a standard deviation of 2.3. The bottom 25% of workers would be re-tasked to another part of the plant, and new workers would be brought in. Which statistic would you use to determine what value would be used to determine the cutoff for re-tasking?

A. *z* for a single score

B. *z* for a sample mean

Ans: A

Learning Objective: Choosing statistic

83. The same arms manufacturing plant as above wants to develop a specialized line for express orders and has developed an alternate training system for this new line to increase production. Fifty workers were chosen at random to receive this special training. After the specialized training, the workers, on average, produced 27 units per hr. What statistic would you use to determine the probability of randomly selecting 50 workers and having their average productivity be 27 units per hour or higher?

A. *z* for a single score

B. *z* for a sample mean

Ans: B

Learning Objective: Choosing statistic

84. The average annual salary for nurses at a hospital is US$71,000 with a standard deviation of US$8000. An administrator wonders if the male nurses are paid more, on average, than the population of nurses at the hospital. To test this hypothesis she obtains a random sample of 25 male nurses and finds that their annual salary is US$73,000. She computes a *z* for a sample mean of 1.875 and a *d* of .375. Which of the following is the best summary of these results?

A. The null hypothesis was rejected.

B. The null hypothesis was not rejected.

C. There was not a significant difference between the salaries of male and female nurses Z (*N* = 25)= 1.87, *p* =.03, *d*=.38.

D. There was a significant difference between the salaries of male and female nurses; males had significantly higher salaries, *z* (*N* = 25) = 1.87, *p* =.03, *d* = .38.

E. There was a significant difference between the salaries of male and female nurses, *z* (*N* = 25) = 1.87, *p* = .03, *d* = .38

Ans: D

Learning Objective: Interpreting test results

85. The Reading Company (TRC) develops educational products that it tries to sell to school districts all across the United States. TRC prides itself on only marketing products that have been empirically supported by research. It has developed a new product that is designed to improve the reading comprehension ability of 3rd through 6th graders. The product costs US$20,000 a year. Obviously, it will be easier to sell this product if TRC can provide potential buyers with empirical evidence that the product actually works. Their researchers took a random sample of 18 students from a school district that had a mean reading comprehension score of µ = 400 with a standard deviation of 100. *The population of reading comprehension scores is normally shaped.* After using the product for two semesters the mean reading comprehension scores for these 18 students was *M* = 443, *z* = 1.82, *d* = .43. Based on the obtained *z* value for the above TRC study and an α level of .05, do they have sufficient evidence to reject their null hypothesis?

A. Yes, the *z* score is in the critical region.

B. Yes, the *z* score is outside of the critical region.

C. No, the *z* score is in the critical region.

D. No, the *z* score is outside of the critical region.

Ans: A

Learning Objective: Interpreting test results

86. A rival company, We Be Education Company (WBEC), is also trying to develop a similar product which cost US$5,000 per year. Their researchers took a random sample of 81 students from a school district that had a mean reading comprehension score of µ = 400 with a standard deviation of 100. After using the product for two semesters the mean reading comprehension scores for these 81 students was *M* = 419, *z* = 1.71, *d* = .19. Based on the obtained *z* value for the above WBEC study and an α level of .05, do they have sufficient evidence to reject their null hypothesis?

A. Yes, the *z* score is in the critical region.

B. Yes, the *z* score is outside the critical region.

C. No, the *z* score is outside of the critical region.

D. No, the *z* score is in the critical region.

Ans: A

Learning Objective: Interpreting test results

87. The Reading Company (TRC) develops educational products that it tries to sell to school districts all across the United States. TRC prides itself on only marketing products that have been empirically supported by research. It has developed a new product that is designed to improve the reading comprehension ability of 3rd through 6th graders. The product costs US$20,000 a year. Obviously, it will be easier to sell this product if TRC can provide potential buyers with empirical evidence that the product actually works. Their researchers took a random sample of 18 students from a school district that had a mean reading comprehension score of µ = 400 with a standard deviation of 100. *The population of reading comprehension scores is normally shaped.* After using the product for two semesters the mean reading comprehension scores for these 18 students was *M* = 443, *z* = 1.82, *d* = .43.

A rival company, We Be Education Company (WBEC), is also trying to develop a similar product, which costs US$5,000 per year. Their researchers took a random sample of 81 students from a school district that had a mean reading comprehension score of µ = 400 with a standard deviation of 100. After using the product for two semesters the mean reading comprehension scores for these 81 students was *M* = 419, *z* = 1.71, *d* = .19.

You must purchase one of these two products. Discuss the relative advantages and disadvantages of the two products with respect to s*ample size, result of the hypothesis test, effect size and cost*. Note that these four criteria may not be equally important. You should consider all criteria and decide which should receive the most weight in your decision. *Be sure to select one product.* *[I will assign points to your answer based on your reasoning. 4 points possible]*

Learning Objective: Interpreting test results