Test Bank

# Chapter 7: Single-Sample *t* Test

## Multiple Choice

1. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Which of the following statements is relevant to the assumption of Normality?*

A. the standard deviation for young mothers is not expected to be different than the standard deviation in the population

B. only one baby was measured per mother

C. weights of babies are normally distributed in the population

D. the study used a sample that is different than the comparison population and measured weight on a ratio scale

Ans: C

Learning Objective: Single-sample *t* assumptions

2. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Which of the following statements is relevant to the assumption of Homogeneity of Variance?*

A. The standard deviation for young mothers is not expected to be different than the standard deviation in the population.

B. Only one baby was measured per mother.

C. Weights of babies are normally distributed in the population.

D. The study used a sample that is different than the comparison population and measured weight on a ratio scale.

Ans: A

Learning Objective: Single-sample *t* assumptions

3. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Which of the following statements is relevant to the assumption of Independence?*

A. The standard deviation for young mothers is not expected to be different than the standard deviation in the population.

B. Only one baby was measured per mother.

C. Weights of babies are normally distributed in the population.

D. The study used a sample that is different than the comparison population and measured weight on a ratio scale.

Ans: B

Learning Objective: Single-sample *t* assumptions

4. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Which of the following statements is relevant to the assumption of Appropriate Measurement of the Variables?*

A. The standard deviation for young mothers is not expected to be different than the standard deviation in the population.

B. Only one baby was measured per mother.

C. Weights of babies are normally distributed in the population.

D. The study used a sample that is different than the comparison population and measured weight on a ratio scale.

Ans: D

Learning Objective: Single-sample *t* assumptions

5. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Select the two-tailed null hypothesis for this statistical analysis.*

A. µ ≠ 7.5

B. µ = 7.5

C. µ > 7.5

D. µ ≠ 7.3

E. µ ≤ 7.5

F. µ > 7.3

G. µ = 7.3

H. µ ≤ 7.3

Ans: A

Learning Objective: Single-sample *t* hypotheses

6. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Select the two-tailed RESEARCH hypothesis for this statistical analysis.*

A. µ ≠ 7.5

B. µ = 7.5

C. µ > 7.5

D. µ ≠ 7.3

E. µ ≤ 7.5

F. µ > 7.3

G. µ = 7.3

H. µ ≤ 7.3

Ans: B

Learning Objective: Single-sample *t* hypotheses

7. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Select the two-tailed null hypothesis for this statistical analysis*.

A. The babies of young mothers will be significantly lighter than the weight of babies in the general population.

B. The babies of young mothers will not be significantly different than the weight of babies in the general population.

C. The babies of young mothers will be significantly different than the weight of babies in the general population.

D. The babies of young mothers will be significantly heavier than the weight of babies in the general population.

Ans: B

Learning Objective: Single-sample *t* hypotheses

8. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Select the two-tailed RESEARCH hypothesis for this statistical analysis.*

A. The babies of young mothers will be significantly lighter than the weight of babies in the general population.

B. The babies of young mothers will not be significantly different than the weight of babies in the general population.

C. The babies of young mothers will be significantly different than the weight of babies in the general population.

D. The babies of young mothers will be significantly heavier than the weight of babies in the general population.

Ans: C

Learning Objective: Single-sample *t* hypotheses

9. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Locate the critical region.*

A. Reject H0 if *t* >1.9879 or *t* < −1.9879

B. Reject H0 if *t* >1.9879

C. Reject H0 if *t* < −1.9879

Ans: A

Learning Objective: Single-sample *t* critical region

10. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Which of the following values would be an estimate of the amount of sampling error in the study?*

A. −0.33

B. −0.06

C. −3.11

D. 0.33

E. 0.06

F. 3.11

Ans: E

Learning Objective: Single-sample *t* sampling error

11. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Compute the single-sample t-test.*

A. −0.33

B. −0.06

C. −3.11

D. 0.33

E. 0.06

F. 3.11

Ans: C

Learning Objective: Single-sample *t* computations

12. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Should you reject or fail to reject the null hypothesis?*

A. reject

B. fail to reject

Ans: A

Learning Objective: Single-sample *t* reject or fail to reject

13. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Compute the effect size for this study.*

A. −0.33

B. −0.06

C. −3.11

D. 0.33

E. 0.06

F. 3.11

Ans: A

Learning Objective: Single-sample *t* effect size computation

14. A recent study revealed that the average weight of babies born in the US is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *How large is this effect?*

A. small

B. small–medium

C. medium

D. medium–large

E. large

Ans: B

Learning Objective: Single-sample *t* effect size interpretation

15. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Compute the 95% confidence interval around the sample mean of 7.3.*

A. LB: 6.68; UB: 13.98

B. LB: 6.32; UB: 8.28

C. LB: 6.72; UB: 8.23

D. LB: 7.17; UB: 7.43

Ans: D

Learning Objective: Single-sample *t* confidence interval around mean

16. A recent study revealed that the average weight of babies born in the United States is normally distributed with a mean of 7.5 pounds. This number is lower than recent years and so researchers are interested in determining what factors are associated with lower birth weights. One researcher decides to look at the age of the mother to determine if younger mothers have babies that are significantly heavier or lighter than average. To study this the researcher collects data from 87 babies who were born to mothers between the ages of 16 and 18. Only one baby was measured per mother. Twins and other multiple births were excluded. The average weight for these babies was 7.3 pounds with a standard deviation of .6 pounds. *Was the average weight of babies of young mothers significantly different than babies in the general population?*

A. Yes, they were lighter.

B. Yes, they were heavier.

C. No, the difference was not significant.

Ans: A

Learning Objective: Single-sample *t* interpret hypothesis test

17. The average “psychological health” score for college professors in America is µ = 24 on a standardized “psychological health” survey. A statistics student from Valpo wants to know if professors from Valpo have “psychological health” scores that are significantly lower than the national average. The student has 36 Valpo professors complete the survey and finds that their mean to be 21 with a standard deviation of 5. Which of the following would be the best *null hypothesis* for this statistical analysis? Do a one-tailed test.

A. the psychological health of the Valpo professors will be 5

B. the psychological health of the Valpo professors will be 21

C. the psychological health of the Valpo professors will be 24

D. the psychological health of the Valpo professors will be 5 or higher

E. the psychological health of the Valpo professors will be 21 or higher

F. the psychological health of the Valpo professors will be 24 or higher

Ans: F

Learning Objective: Single-sample *t* hypotheses

18. The average “psychological health” score for college professors in America is µ = 24 on a standardized “psychological health” survey. A statistics student from Valpo wants to know if professors from Valpo have psychological health scores that are significantly lower than the national average. The student has 36 Valpo professors complete the survey and finds that their mean to be 21 with a standard deviation of 5. Which of the following would be the best RESEARCH HYPOTHESIS for this statistical analysis? Do a one-tailed test.

A. the psychological health of the Valpo professors will be lower than 5

B. the psychological health of the Valpo professors will be lower than 21

C. the psychological health of the Valpo professors will be lower than 24

D. the psychological health of the Valpo professors will be greater than 5

E. the psychological health of the Valpo professors will be greater than 21

F. the psychological health of the Valpo professors will be greater than 24

Ans: C

Learning Objective: Single-sample *t* hypotheses

19. The average “psychological health” score for college professors in America is µ = 24 on a standardized psychological health survey. A statistics student from Valpo wants to know if professors from Valpo have psychological health scores that are significantly lower than the national average. The student has 36 Valpo professors complete the survey and finds that their mean to be 21 with a standard deviation of 5. Which of the following values would represent the value of sampling error in this analysis?

A. 21/6

B. 6/5

C. 36/6

D. 36/5

E. 5/6

Ans: E

Learning Objective: Single-sample *t* sampling error

20. The average “psychological health” score for college professors in America is µ = 24 on a standardized psychological health survey. A statistics student from Valpo wants to know if professors from Valpo have psychological health scores that are significantly lower than the national average. The student has 36 Valpo professors complete the survey and finds that their mean to be 21 with a standard deviation of 5. Which of the following values is the obtained *t*-value in this analysis?

A. −2

B. −1.6896

C. −1.697

D. −3.6

E. −2

Ans: D

Learning Objective: Single-sample *t* computations

21. The average “psychological health” score for college professors in America is µ = 24 on a standardized psychological health survey. A statistics student from Valpo wants to know if professors from Valpo have psychological health scores that are significantly lower than the national average. The student has 36 Valpo professors complete the survey and finds that their mean to be 21 with a standard deviation of 5. Which of the following values is the critical *t*-value in this analysis?

A. −2

B. −1.6896

C. −1.697

D. −3.6

E. −2

Ans: B

Learning Objective: Single-sample *t* critical regions

22. The average “psychological health” score for college professors in America is µ = 24 on a standardized psychological health survey. A statistics student from Valpo wants to know if professors from Valpo have psychological health scores that are significantly lower than the national average. The student has 36 Valpo professors complete the survey and finds that their mean to be 21 with a standard deviation of 5. Do a one-tailed test. Would you reject the null hypothesis in this study?

A. Yes

B. No

Ans: A

Learning Objective: Single-sample *t* reject or fail to reject

23. The average “psychological health” score for college professors in America is µ = 24 on a standardized psychological health survey. A statistics student from Valpo wants to know if professors from Valpo have psychological health scores that are significantly lower than the national average. The student has 36 Valpo professors complete the survey and finds that their mean to be 21 with a standard deviation of 5. Which of the following is the correct effect size for this study?

A. 0.6

B. 3.6

C. 1.697

D. 0.08

E. 0

Ans: A

Learning Objective: Single-sample *t* effect size

24. Which of the following would be the best one-sentence summary of these results in APA style?

A. The psychological health of the Valpo Professors is significantly different from the national average, *t*(35) = 2.0, *p* < .05.

B. The psychological health of the Valpo Professors is not significantly different from the national average, *t*(35) = −1.697, *p* > .05.

C. The psychological health of the Valpo Professors is significantly lower than national average, *t*(35) = −3.6, *p* < .05.

D. The psychological health of the Valpo Professors is not significantly lower from the national average, *t*(35) = .6, *p* > .05.

Ans: C

Learning Objective: Single-sample *t* summary

25. What is the primary advantage associated with using a one tailed test?

A. more statistical power

B. less likely to make a Type I error

C. less likely to make a Type II error

D. All of these are advantages to doing a one-tailed test rather than a two-tailed test.

Ans: A

Learning Objective: Single-sample *t* one vs two tailed

26. What does the number in the numerator of the *t*-test represent?

A. the observed difference between means

B. statistical power

C. the expected amount of sampling error

D. the typical distance between scores and the mean

Ans: A

Learning Objective: Single-sample *t* understanding the formulas

27. What do you expect the numerator of the *t*-test to equal if the null hypothesis is true?

A. zero

B. the sample mean

C. the population mean

D. You can’t know the exact value

Ans: A

Learning Objective: Single-sample *t* understanding the formulas

28. What do you expect the numerator of the *t*-test to equal if the research hypothesis is true?

A. zero

B. the sample mean

C. the population mean

D. You can’t know the exact value

Ans: D

Learning Objective: Single-sample *t* understanding the formula

29. What does the number in the denominator of the t-test represent?

A. the observed difference between means

B. statistical power

C. the expected amount of sampling error

D. the typical distance between scores and the mean

Ans: C

Learning Objective: Single-sample *t* understanding the formula

30. How can you decrease the denominator of the *t*-test?

A. increase *N*

B. use an alpha of .01 rather than .05

C. use two groups rather than one.

Ans: A

Learning Objective: Single-sample *t* understanding the formula

31. The basic structure for both *z*-tests and *t*-tests is such that the numerator is \_\_\_\_\_\_ and the denominator is \_\_\_\_\_\_.

A. the observed difference between standard deviations; the difference expected by chance (sampling error)

B. the observed difference between means; the difference expected by chance (sampling error)

C. the difference expected by chance (sampling error); the observed difference between standard deviations

D. the difference expected by chance (sampling error); the observed difference between means

Ans: B

Learning Objective: Single-sample *t* understanding the formula

32. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. Which of the following facts suggests that the assumption of Normality was met?

A. The *SD* and σ are probably similar in this situation.

B. The study clearly defined how the sample was different from the population and reading comprehension scores are measured on an interval/ratio scale.

C. The population of reading comprehension scores are normally distributed.

D. Each student took the test under controlled conditions (no one copied off of other students)

Ans: C

Learning Objective: Single-sample *t* assumptions

33. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. Which of the following facts suggests that the assumption of Independence was met?

A. The *SD* and σ are probably similar in this situation.

B. The study clearly defined how the sample was different from the population and reading comprehension scores are measured on an interval/ratio scale.

C. The population of reading comprehension scores are normally distributed.

D. Each student took the test under controlled conditions (no one copied off of other students).

Ans: D

Learning Objective: Single-sample *t* assumptions

34. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. Which of the following facts suggests that the assumption of Homogeneity of Variance was met?

A. The *SD* and σ are probably similar in this situation.

B. The study clearly defined how the sample was different from the population and reading comprehension scores are measured on an interval/ratio scale.

C. The population of reading comprehension scores are normally distributed.

D. Each student took the test under controlled conditions (no one copied off of other students)

Ans: A

Learning Objective: Single-sample *t* assumptions

35. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. Which of the following facts suggests that the assumption of Appropriate Measurement of Varibles was met?

A. The *SD* and σ are probably similar in this situation.

B. The study clearly defined how the sample was different from the population and reading comprehension scores are measured on an interval/ratio scale.

C. The population of reading comprehension scores are normally distributed.

D. Each student took the test under controlled conditions (no one copied off of other students)

Ans: B

Learning Objective: Single-sample *t* assumptions

36. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. What are the *one-tailed* null and research hypotheses for this statistical analysis?

A. H0: μ = 75, H1: μ ≠ 75

B. H0: μ > 75, H1: μ ≤ 75

C. H0: μ ≤ 75, H1: μ > 75

D. H0: μ = 75.9, H1: μ ≠ 75.9

E. H0: μ > 75.9, H1: μ ≤ 75.9

F. H0: μ ≤ 75.9, H1: μ > 75.9

Ans: C

Learning Objective: Single-sample *t* hypotheses

37. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. Compute the *df* and find the critical value. Use an α of .05.

A. 1.6577

B. 2.3578

C. 1.9799

D. 2.6174

E. 1.9600

Ans: A

Learning Objective: Single-sample *t* critical region

38. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. Compute the single-sample *t*-test.

A. 1.56

B. 0.18

C. 1.97

D. 0.53

E. 0.45

F. 0.90

G. 2.10

Ans: C

Learning Objective: Single-sample *t* computations

39. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. The researchers in this study should:

A. reject the null hypothesis

B. fail to reject the null hypothesis

Ans: A

Learning Objective: Single-sample *t* reject or fail to reject

40. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. Compute the effect size of this study.

A. 1.56

B. 0.18

C. 1.97

D. 0.53

E. 0.45

F. 0.90

G. 2.10

Ans: B

Learning Objective: Single-sample *t* effect size computations

41. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. How large is the effect?

A. small

B. small–medium

C. medium

D. medium–large

E. large

Ans: A

Learning Objective: Single-sample *t* effect size interpretation

42. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. Compute the 95% CI for the mean reading comprehension score of the students after they experience the new reading comprehension program.

A. [74.1, 75.9]

B. [75.15, 76.65]

C. [75, 76.8]

D. [74.1, 76.2]

Ans: C

Learning Objective: Single-sample *t* confidence intervals

43. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. Which of the following is the best interpretation of the 95% CI?

A. We can be 95% confident that the true *sample mean* is between the upper bound and lower bound.

B. We can be 95% confident that the true *population mean* is higher than the upper bound.

C. We can be 95% confident that the true *population mean* is lower than the lower   
bound.

d. We can be 95% confident that the true *population mean* is either lower than the lower bound or higher than the higher bound.

E. We can be 95% confident that the true *population mean* is between the upper bound and lower bound.  
Ans: E

Learning Objective: Single-sample *t* confidence intervals

44. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. What is the take home message from this study? In your answer consider the results of the significance test, the effect size, and the sample size of the study. After you consider all of these factors what would you conclude about the impact of this reading program on test scores?

A. The reading program did not improve scores and the effect size was small.

B. The reading program did improve scores, but the amount of improvement was small.

C. The reading program did improve scores and the effect size was significant.

D. There was too much sampling error to determine if the reading program worked.

E. The reading program did not improve score, but the effect size was significant, so the study should be repeated with a larger sample size.

Ans: B

Learning Objective: Single-sample *t* confidence intervals

45. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over, these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. The principal used a one-tailed rather than a two-tailed test. Was this a good choice?

A. Yes, he was only concerned with determining if the reading program improved scores and doing a one-tailed test increased statistical power.

B. Yes, he wanted to see how much of an effect the program would have and did not need further information on whether it was effective or not.

C. No, he should have done a two-tailed test because the reading program might have lowered scores.

D. No, the population standard deviation was not known and was estimated from the sample data.

Ans: A

Learning Objective: Single-sample *t* one and two tailed tests

46. The average score for Indiana public school 6th graders on a standardized reading comprehension test is µ = 75, and the distribution is normally shaped. A principal of one school in northwest Indiana wants to know if a new reading program *improves* scores compared to the Indiana population mean. The principal takes a sample of 121 students and gives all of them the new reading program for one semester. After the semester is over these 121 students are given a reading comprehension test. Their mean score is 75.9 with a standard deviation of 5. Coincidentally, a principal of a different school in northwest Indiana conducts a similar study. This principle chose to use a larger sample of students and to analyze the results with a *t*-test. What impact does having a larger sample size have on the *location* of the critical *t*-value? A larger sample size would make the critical *t*-value of the second study be:

A. closer to zero.

B. further from zero.

C. the same as in the previous study.

Ans: A

Learning Objective: Single-sample *t* sample size and critical values

47. What impact does having a larger sample have on the *size* of the critical region (i.e., the percentage of the distribution that is in the critical region)? A larger sample size:

A. makes the critical region smaller.

B. makes the critical region bigger.

C. has no impact on the size of the critical region.

Ans: C

Learning Objective: Single-sample *t* sample size and critical values

48. The study with the larger sample size will have \_\_\_\_\_\_ *statistical power* than the study with the smaller sample size.

A. less

B. more

C. the same amount of

Ans: B

Learning Objective: Single-sample *t* sample size and power

49. A researcher gives one group of 10 people a placebo for 1 week and another group of 10 people an antianxiety drug for 1 week. At the end of the week, she measures the anxiety levels of the people in the two groups. The researcher decides to do a one-tailed test using an α of .01. The anxiety levels for the placebo group *M* = 54.20 (*SD* = 8.43) were not significantly different than the anxiety levels for the drug group was *M* = 50.43 (*SD* = 9.34), *t*(18) = .93, *p* > .01, two tailed, *d* =.42. How could this researcher increase statistical power in her next study?

A. use more people in the placebo and drug group

B. increase the variability in the placebo and drug groups

C. increase the mean level of anxiety in the drug group.

Ans: A

Learning Objective: Single-sample *t* power

50. A researcher gives one group of 10 people a placebo for 1 week and another group of 10 people an antianxiety drug for 1 week. At the end of the week, she measures the anxiety levels of the people in the two groups. The researcher decides to do a one-tailed test using an α of .01. The anxiety levels for the placebo group *M* = 54.20 (*SD* = 8.43) were not significantly different than the anxiety levels for the drug group was *M* = 50.43 (*SD* = 9.34), *t*(18) = .93, *p* > .01, two tailed, *d* =.42. How could this researcher increase statistical power in her next study?

A. increase α to .05

B. decrease α to .001

Ans: A

Learning Objective: Single-sample *t* power

51. An experiment was done to determine if a program designed to improve the body image of young girls and boys was effective. In this scenario, which of the following describes a *Type I error*?

A. concluding that the program did improve body image when it really did not

B. concluding that the program did not improve body image when it really did not

C. concluding that the program did improve body image when it really did

D. concluding that the program did not improve body image when it really did

Ans: A

Learning Objective: Single-sample *t* Type I error

52. An experiment was done to determine if a program designed to improve the body image of young girls and boys was effective. In this scenario, which of the following describes a *Type II error*?

A. concluding that the program did improve body image when it really did not

B. concluding that the program did not improve body image when it really did not

C. concluding that the program did improve body image when it really did

D. concluding that the program did not improve body image when it really did

Ans: D

Learning Objective: Single-sample *t* Type II error

53. An experiment was done to determine if a program designed to improve the body image of young girls and boys was effective. In this scenario, which of the following describes *Statistical power*?

A. concluding that the program did improve body image when it really did not

B. concluding that the program did not improve body image when it really did not

C. concluding that the program did improve body image when it really did

D. concluding that the program did not improve body image when it really did

Ans: C

Learning Objective: Single-sample *t* power

54. As *N* increases, what happens to the critical value (assume that alpha is .05)?

A. It moves closer to 0.

B. It moves further from 0.

C. It does not change.

Ans: A

Learning Objective: Single-sample *t* sample size and critical values

55. As *N* increases, what happens to size of the critical region (assume that alpha is .05)?

A. It moves closer to 0.

B. It moves further from 0.

C. It does not change.

Ans: C

Learning Objective: Single-sample *t* sample size and critical region

56. In general, the higher the *t*-value, the \_\_\_\_\_\_ the *p*-value (assume equal *df*).

A. higher

B. lower

Ans: B

Learning Objective: Single-sample *t* *p* values

57. In general, the lower the *t*-value, the \_\_\_\_\_\_ the *p*-value (assume equal *df*).

A. higher

B. lower

Ans: A

Learning Objective: Single-sample *t* *p* values

58. Which of the following obtained *t*-values is going to have the smallest *p* value? Assume that all four obtained *t-*values came from studies with the same sample size. Also, assume that you are conducting a two-tailed test.

A. −0.23

B. −2.01

C. 1.98

D. 0.50

Ans: B

Learning Objective: Single-sample *t* *p* values

59. Which of the following obtained *t*-values is going to have the smallest *p* value? Assume that all four obtained *t-*values came from studies with the same sample size. Also, assume that you are conducting a one tailed test.

A. 0.50

B. 1.68

C. .72

D. −0.152

Ans: B

Learning Objective: Single-sample *t* *p* values

60. If a researcher sets the significance level for a hypothesis test at α= .05 before she computes a *one sample t-test* which of the following is determined by this decision and is not influenced by any other factors?

A. the probability of a Type I error

B. the probability of a Type II error

C. the critical value

D. the obtained *t-*value

Ans: A

Learning Objective: Single-sample *t* Type I error and α