**STUDY QUESTIONS**

1. A researcher wants to estimate the difference in the means of two populations. A random sample of 40 items from the first population results in a sample mean of 433 with a population standard deviation of 112. A random sample of 50 items from the second population results in a sample mean of 467 with a population standard deviation of 120. From this information, a point estimate of the difference of population means can be computed as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. Using the information from question 1, the researcher can compute a 95% confidence interval to estimate the difference in population means. The resulting confidence interval is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3. A random sample of 32 items is taken from a population which has a population variance of 93. The resulting sample mean is 45.6. A random sample of 37 items is taken from a population which has a population variance of 88. The resulting sample mean is 49.4. Using this information, a 98% confidence interval can be computed to estimate the difference in means of these two populations. The resulting interval is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. A researcher desires to estimate the difference in means of two populations. To accomplish this, he/she takes a random sample of 85 items from the first population. The sample yields a mean of 168 with a population variance of 783. A random sample of 70 items is taken from the second population yielding a mean of 161 with a population variance of 780. A 94% confidence interval is computed to estimate the difference in population means. The resulting confidence interval is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. Is there a difference in the average number years of experience of assembly line employees between company A and company B? A researcher wants to conduct a statistical test to answer this question. He is likely to be conducting a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-tailed test.

6. The researcher who is conducting the test to determine if there is a difference in the average number of years of experience of assembly line workers between companies A and B is using an alpha of .10. The critical value of *z* for this problem is \_\_\_\_\_\_\_\_\_\_.

7. Suppose the researcher conducting an experiment to compare the ages of workers at two companies. The researcher randomly samples forty-five assembly-line workers from company A and discovers that the sample average is 7.1 years with a population standard deviation of 2.3. Fifty-two assembly-line workers from company B are randomly selected resulting in a sample average of 6.2 years and a population standard deviation of 2.7. The observed *z* value for this problem is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. Using an alpha of .10 and the critical values determined in questions 6 and 7, the decision is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the null hypothesis.

9. A researcher has a theory that the mean for population A is less than the mean for population B. To test this, she randomly samples thirty-eight items from population A and determines that the sample average is 38.4 with a population variance of 50.5 She randomly samples thirty-two items from population B and determines that the sample average is 44.3 with a population variance of 48.6 Alpha is .05. She is going to conduct a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-tailed test.

10. Using the information from question 9, the critical *z* value is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

11. Using the information from question 9, the observed value of *z* is

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

12. Using the results determined in question 10 and 11, the decision is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the null hypothesis.

13. A researcher is interested in testing to determine if the mean of population one is greater than the mean of population two. He uses the following hypotheses to test this theory:

Ho: *µ*1 - *µ*2 = 0

Ha: *µ*1 - *µ*2 > 0

He randomly selects a sample of 8 items from population one resulting in a mean of 14.7 and a standard deviation of 3.4. He randomly selects a sample of 12 items from population two resulting in a mean of 11.5 and a standard deviation 2.9. He is using an alpha value of .10 to conduct this test. The degrees of freedom for this problem are \_\_\_\_\_\_\_\_\_\_\_\_\_. It is assumed that these values are normally distributed in both populations.

14. The critical table *t* value used to conduct the hypothesis test in question 13 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

15. The observed *t* value from the sample data is \_\_\_\_\_\_.

16. Based on the observed *t* value obtained in question 15 and the critical table *t* value in question 14, the researcher should \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the null hypothesis.

17. What is the difference in the means of two populations? A researcher wishes to determine this by taking random samples of size 14 from each population and computing a 90% confidence interval. The sample from the first population produces a mean of 780 with a standard deviation of 245. The sample from the second population produces a mean of 890 with a standard deviation of 256. The point estimate for the difference in the means of these two populations is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Assume that the values are normally distributed in each population.

18. The table *t* value used to construct the confidence interval for the problem in question 17 is \_\_\_\_\_\_\_\_\_\_.

19. The confidence interval constructed for the problem in question 17 is \_\_\_\_\_\_\_\_\_\_.

20. The matched-pairs *t* test deals with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ samples.

21. A researcher wants to conduct a before/after study on 13 subjects to determine if a treatment results in higher scores. The hypotheses are:

Ho: *D* = 0

Ha: *D* < 0

Scores are obtained on the subjects both before and after the treatment. After subtracting the after scores from the before scores, the resulting value of  is -2.85 with a *S*d of 1.01. The degrees of freedom for this test are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Assume that the data are normally distributed in the population.

22. The critical table *t* value for the problem in question 21 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ if

*α* = .01.

23. The observed *t* value for the problem in question 21 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

24. For the problem in question 21 based on the critical table *t* value obtained in question 22 and the observed *t* value obtained in question 23, the decision should be to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the null hypothesis.

25. A researcher is conducting a matched-pairs study. She gathers data on each pair in the study resulting in:

Pair Group 1 Group 2

1 10 12

2 13 14

3 11 15

4 14 14

5 12 11

6 12 15

7 10 16

8 8 10

Assuming that the data are normally distributed in the population, the computed

value of  is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

26. The value of *sd* for the problem in question 25 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

27. The degrees of freedom for the problem in question 25 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

28. The observed value of *t* for the problem in question 25 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

29. A researcher desires to estimate the difference between two related populations. He gathers pairs of data from the populations. The data are below:

Pair Group 1 Group 2

1 360 280

2 345 290

3 355 300

4 325 270

5 340 300

6 365 310

It is assumed that the data are normally distributed in the population. Using this data, the value of is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

30. For the problem in 29, the value of *sd* is \_\_\_\_\_\_\_\_\_\_.

31. The point estimate for the population difference for the problem in question 29 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

32. The researcher conducting the study for the problem in question 29 wants to use a 95% level of confidence. The table *t* value for this confidence interval is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

33. The confidence interval computed for the problem in question 29 is

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

34. A researcher is interested in estimating the difference in two populations proportions. A sample of 1000 from each population results in sample proportions of .61 and .64. The point estimate of the difference in the population proportions is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

35. Using the data from question 34, the researcher computes a 90% confidence interval to estimate the difference in population proportions. The resulting confidence interval is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

36. A random sample of 400 items from a population shows that 110 of the sample items possess a given characteristic. A random sample of 550 items from a second population resulted in 154 of the sample items possessing the characteristic. Using this data, a 99% confidence interval is constructed to estimate the difference in population proportions which possess the given characteristic. The resulting confidence interval is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

37. A researcher desires to estimate the difference in proportions of two populations. To accomplish this, he/she samples 338 and 332 items respectively from each population. The resulting sample proportions are .71 and .68 respectively. Using this data, a 90% confidence interval can be computed to estimate the difference in population proportions. The resulting confidence interval is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

38. A statistician is being asked to test a new theory that the proportion of population A possessing a given characteristic is greater than the proportion of population B possessing the characteristic. A random sample of 625 from population A has been taken and it is determined that 463 possess the characteristic. A random sample of 704 taken from population B results in 428 possessing the characteristic. The alternative hypothesis for this problem is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

39. The observed value of *z* for question 38 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

40. Suppose alpha is .10. The critical value of *z* for question 38 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

41. Based on the results of question 39 and 40, the decision for the problem in question 38 is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the null hypothesis.

42. In testing hypotheses about two population variances, use the

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ distribution.

43. Suppose we want to test the following hypothesis:

H0: *σ*12 = *σ*22 and Ha: *σ*12 > *σ*22

A sample of 9 items from population one yielded a sample standard deviation of 8.6.

A sample of 8 items from population two yielded a sample standard deviation of 6.9.

If alpha is .05, the critical *F* value is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

44. The observed *F* value for question 45 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The resulting

decision is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**ANSWERS TO STUDY QUESTIONS**

1. –34 23. –10.17

2. –82.07 < *μ*1 - *μ*2 < 14.07 24. Reject

3. –9.16 < *μ*1 - *μ*2 < 1.56 25. –2.125

4. –1.48 < *μ*1 - *μ*2 < 15.48 26. 2.232

5. Two 27. 7

6. + 1.645 28. –2.69

7. 1.77 29. 56.67

8. Reject 30. 12.91

9. One 31. 56.67

10. –1.645 32. 2.571

11. –3.50 33. 43.12 < *D* < 70.22

12. Reject 34. -.03

13. 18 35. -.066 < *p*1 – *p*2 < .006

14. 1.33 36. -.081 < *p*1 – *p*2 < .071

15. 2.26 37. -.0285 < *p*1 – *p*2 < .0885

16. Reject 38. *p*A – *p*B > 0

17. –110 39. 5.14

18. 1.706 40. 1.28

19. –271.56 < *μ*1 - *μ*2 < 51.56 41. Reject

20. Related 42. *F*

21. 12 43. 3.73

22. –2.681 44. 1.55, Fail to Reject the Null

Hypothesis