Name: _____

Chapter 10

1. Which of the following research situations is most likely to use an independent-measures design?

- a. Evaluate the difference in verbal skills between 3-year-old girls and 3-year-old boys.
- b. Evaluate the development of verbal skills between age 2 and age 3 for a sample of girls.
- c. Evaluate the effectiveness of a cholesterol medication by comparing cholesterol levels before and after the medication.
- d. Evaluate the effectiveness of a diet program by measuring how much weight is lost during 4 weeks of dieting.

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2. The null hypothesis for the independent-measures t test states:

- a. $\mu_1 - \mu_2 = 0$
- b. $M_1 - M_2 = 0$
- c. $\mu_1 - \mu_2$ 0
- d. $M_1 - M_2$ 0

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3. One sample has n = 6 and SS = 20 and a second sample has n = 6 and SS = 30. What is the pooled variance for the two samples?

- a. 25
- b. 50
- c. 50/10
- d. 50/6

---

4. One sample of n = 5 scores has a variance of $s^2 = 10$ and a second sample of n = 10 scores has $s^2 = 20$. If the pooled variance is computed for these two samples, then the value obtained will be _____.

- a. closer to 10 than to 20
- b. Cannot be determined without more information.
- c. closer to 20 than to 10
- d. exactly half way between 10 and 20

---

5. Which of the following sets of sample data would produce the largest value for an independent-measures t statistic? Assume that n = 10 for all samples. Note: You should not need to do any serious calculations to answer this question.

- a. First sample: M = 30 and SS = 50. Second Sample: M = 35 and SS = 50.
- b. First sample: M = 30 and SS = 10. Second Sample: M = 50 and SS = 10.
- c. First sample: M = 30 and SS = 10. Second Sample: M = 35 and SS = 10.
- d. First sample: M = 30 and SS = 50. Second Sample: M = 50 and SS = 50.

---

6. Two samples, each with n = 6 subjects, produce a pooled variance of 20. Based on this information, the estimated standard error for the sample mean difference would be _____.

- a. the square root of (20/5 + 20/5)
- b. the square root of (20/6 + 20/6)
- c. 20/6
- d. 20/12

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7. A researcher reports t(24) = 5.30 for an independent-measures experiment. How many individuals participated in the entire experiment?

- a. 12
- b. 26
- c. 25
- d. 24

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8. An independent-measures experiment uses one sample with n = 10 and a second sample with n = 15 to compare two experimental treatments. The t statistic from this experiment will have degrees of freedom equal to _____.

- a. 25
- b. 24
- c. 23
- d. Cannot be determined with unequal sample sizes.

---

9. For an independent-measures research study, the value of Cohen's d or r^2 helps to describe:

- a. the risk of a Type I error.
- b. the risk of a Type II error.
- c. how much difference there is between the two treatments.
- d. whether the difference between the two treatments is likely to have occurred by chance.

---

10. For the independent-measures t statistic, if other factors are held constant, increasing sample variance will _____ the chances of a significant t statistic and _____ measures of effect size.

- a. decrease, decrease
- b. increase, increase
- c. increase, decrease
- d. decrease, increase

Chapter 11

1. For which of the following situations would a repeated-measures study be appropriate?

- a. Compare personality scores for individuals diagnosed with an eating disorder and those who are not diagnosed.
- b. Compare salary levels for college graduates and those who did not graduate from college.
- c. Compare attitude scores for males versus females.
- d. Compare reaction times before and after taking a pain medication.

2. For a repeated-measures hypothesis test, the null hypothesis states _____.

- a. $\mu_D = 0$
- b. $\mu_1 = \mu_2$
- c. $M_1 = M_2$
- d. $M_D = 0$

3. In general, if the variance of the difference scores increases, then the value of the t statistic will:

- a. increase (move farther toward the tail of the distribution).
- b. stay the same - the t statistic is not affected by the variance of the difference scores.
- c. may increase or may decrease. There is no consistent relationship between variance and the size of the t statistic.
- d. decrease (move toward 0 at the center of the distribution).

4. A research report describing the results from a repeated-measures study includes the following: "The data show no significant difference between the two treatments, $t(10) = 1.65$, $p > .05$." Based on this report, you can conclude that a total of _____ individuals participated in the research study.

- a. 11
- b. 9
- c. 10
- d. 12

5. A researcher uses a repeated-measures study to compare two treatment conditions with a set of 20 scores in each treatment. What would be the value of df for the repeated-measures t statistic?

- a. df = 19
- b. df = 38
- c. df = 39
- d. df = 18

6. A researcher obtains t = 2.10 for a repeated-measures study using a sample of n = 16 participants. Based on this t value, what is the correct decision?

- a. Reject the null hypothesis with either $\alpha = .05$ or $\alpha = .01$
- b. Fail to reject the null hypothesis with either $\alpha = .05$ or $\alpha = .01$
- c. Reject the null hypothesis with $\alpha = .05$ but not with $\alpha = .01$
- d. Cannot make a decision without additional information.

---

7. Which of the following samples will produce the largest value for a t statistic? Assume each sample has n = 10 scores.

- a. $M_D = 10$ with SS = 40
- b. $M_D = 10$ with SS = 20
- c. $M_D = 5$ with SS = 40
- d. $M_D = 5$ with SS = 20

---

8. An advantage of a repeated-measured design (compared to an independent-measures design) is that it reduces the contribution of error variability due to _____.

- a. the effect of the treatment
- b. degrees of freedom
- c. M_D
- d. individual differences

---

9. A researcher obtains a t statistic of t = 2.00 from a repeated measures study using n = 17 participants. If the effect size is measured using r^2 then the value of r^2 for the study would be _____.

- a. $r^2 = 4/16 = 0.25$
- b. $r^2 = 4/20 = 0.20$
- c. $r^2 = 4.00$
- d. The value of r^2 cannot be determined from the information provided.

---

10. A researcher obtains t = 3.00 for a repeated-measures study using a sample of n = 10 participants. If the researcher measures effect size using the percentage of variance accounted for, what value will be obtained for r^2?

- a. 9/18 = 0.50
- b. 9
- c. 9/19 = 0.47
- d. 3/12 = 0.25

Chapter 12

1. Which of the following research questions would be an appropriate situation for using estimation instead of a hypothesis test?

- a. Does the amount of background noise have an effect on people's ability to concentrate?
- b. How much improvement will result from a special program to teach reading skills?
- c. Is there any difference in mathematics skills between adolescent boys and adolescent girls?
- d. Does a new cholesterol medication have any effect?

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2. A researcher knows that 4-year-old girls tend to have better verbal skills than 4-year-old boys. To determine how much better, the researcher obtains a sample of boys and a sample of girls and gives each child a verbal ability test. The scores from the test are used to estimate the mean difference. Which estimation equation should the researcher use?

- a. Cannot answer without additional information.
- b. The single-sample t equation.
- c. The repeated-measures t equation.
- d. The independent-measures t equation.

---

3. The purpose of a confidence interval is to:

- a. use a sample mean or mean difference to estimate the corresponding population mean or mean difference.
- b. use a level of confidence to estimate a sample mean.
- c. use μ to estimate the value of a sample mean.
- d. use the sample mean to determine a level of confidence.

---

4. What value(s) for t would be used for a point estimate of a population mean using a single-sample t statistic?

- a. Cannot answer without additional information.
- b. $t = \pm 1.96$
- c. $t = \pm 1.00$
- d. $t = 0$

---

5. What value(s) can be estimated using the independent-measures t statistic?

- a. The difference between two population means.
- b. The values for two different population means.
- c. The value of an unknown population mean.
- d. The mean for the entire population of difference scores.

---

6. If all other factors are held constant, which of the following would produce the smallest width for a confidence interval for μ?

- a. A 90% confidence interval based on a sample of $n = 100$.
- b. A 90% confidence interval based on a sample of $n = 25$.
- c. An 80% confidence interval based on a sample of $n = 25$.
- d. An 80% confidence interval based on a sample of $n = 100$.

---

7. Two separate samples, each with n = 4, are used to construct a 99% confidence interval for the mean difference between two populations. The correct t values for the interval are _____.

- a. ±2.58
- b. ±3.707
- c. ±2.998
- d. ±3.143

---

8. An 80% confidence interval for the population mean ranges from 14 to 22. Based on this information:

- a. the sample mean is M = 14.
- b. the sample mean is M = 18.
- c. none of the other 3 choices is correct.
- d. the sample mean is M = 22.

---

9. Compared to a point estimate, an interval estimate:

- a. has less precision but greater confidence.
- b. has greater precision and greater confidence.
- c. has less precision and less confidence.
- d. has greater precision but less confidence.

---

10. Estimation would be appropriate:

- a. after a hypothesis test where the decision was to reject the null hypothesis.
- b. after a hypothesis test where the decision was to fail to reject the null hypothesis.
- c. after a hypothesis test no matter what the decision was made.
- d. estimation should never be done after a hypothesis test.

Chapter 13

1. For an experiment comparing more than two treatment conditions you should use analysis of variance rather than separate t tests because:

- a. a test based on variances is more sensitive than a test based on means.
- b. ANOVA has less risk of a Type I Error because several means are compared in one test.
- c. ANOVA has less risk of a Type II Error because several means are compared in one test.
- d. you are less likely to make a mistake in the computations of ANOVA.

---

2. When the null hypothesis is true for an ANOVA, what is the expected value for the F-ratio?

- a. 0
- b. 1.00
- c. N - k
- d. k - 1

---

3. An analysis of variance produces $SS_{total} = 90$ and $SS_{within\ treatments} = 40$. For this analysis, what is $SS_{between\ treatments}$?

- a. 130
- b. Cannot be determined without additional information.
- c. 50
- d. 3600

---

4. In analysis of variance, the F-ratio is a ratio of:

- a. sample variances divided by sample means.
- b. sample means divided by variances.
- c. variances.
- d. sample means.

---

5. For an independent-measures experiment comparing two treatment conditions with a sample of n = 10 in each treatment, the F-ratio would have df equal to _____.

- a. 19
- b. 18
- c. 1, 19
- d. 1, 18

---

6. A researcher reports an F-ratio with df = 2, 36 for an independent-measures experiment. How many treatment conditions were compared in this experiment?

- a. 36
- b. 3
- c. 38
- d. 2

---

7. Which combination of factors is most likely to produce a large value for the F-ratio and a large value for η^2?

- a. Small mean differences and large sample variances.
- b. Large mean differences and large sample variances.
- c. Large mean differences and small sample variances.
- d. Small mean differences and small sample variances.

---

8. The purpose of a post hoc test is to:

- a. determine whether or not a complete ANOVA is justified.
- b. determine which treatments are different.
- c. determine whether or not a Type I Error was made in the ANOVA.
- d. determine how much difference there is between treatments.

---

9. In general the distribution of F-ratios is:

- a. negatively skewed with all values greater than or equal to zero.
- b. positively skewed with all values greater than or equal to zero.
- c. symmetrical with a mean of zero.
- d. symmetrical with a mean equal to $df_{between.}$

---

10. Under what circumstances are post tests necessary?

- a. When you reject the null hypothesis with more than 2 treatment conditions.
- b. When you fail to reject the null hypothesis with more than 2 treatment conditions.
- c. When you fail to reject the null hypothesis with exactly 2 treatment conditions.
- d. When you reject the null hypothesis with exactly 2 treatment conditions.

Chapter 14

1. In the F-ratio for a repeated-measures ANOVA, variability due to individual differences:

- a. must be computed and subtracted out of the numerator and the denominator.
- b. is automatically eliminated from both the numerator and the denominator.
- c. is automatically eliminated from the denominator but must be computed and subtracted out of the numerator.
- d. is automatically eliminated from the numerator but must be computed and subtracted out of the denominator.

---

2. A repeated-measures study uses a sample of n = 8 participants to evaluate the mean differences among three treatment conditions. In the analysis of variance for this study, what is the value for df_{total}?

- a. 23
- b. 7
- c. 2
- d. 21

---

3. In a repeated-measures ANOVA, a P value corresponds to:

- a. the product obtained by multiplying all the scores for each individual person.
- b. each individual score in the research study.
- c. the total of all the scores for an individual treatment.
- d. the total of all the scores for an individual person.

---

4. A researcher obtains an F-ratio with df = 2, 12 from an ANOVA for a repeated-measures research study. How many subjects participated in the research study?

- a. 13
- b. 7
- c. 15
- d. 14

---

5. Which of the following are sources of variability that contribute to $SS_{\text{between treatments}}$ in a repeated ANOVA?

- a. treatment effect, individual differences, and chance/error
- b. treatment effect and individual differences
- c. treatment effect and chance/error
- d. individual differences and chance/error

---

6. In a repeated-measures ANOVA, a P value is obtained by:

- a. N-k
- b. finding the sum of the scores for a participant in the study.
- c. finding the sum of the scores for a treatment.
- d. summing the T values of all treatments.

---

7. In a repeated-measures ANOVA the $SS_{\text{within treatments}}$ is divided into two components. What are they?

- a. between treatments and error
- b. between subjects and error
- c. total variability and error
- d. between subjects and between treatments

---

8. The results of a repeated-measures ANOVA are reported as follows, $F(3, 27)=1.12$, $p > .05$. How many subjects participated in the study?

- a. 36
- b. 40
- c. 9
- d. 10

---

9. For a repeated-measures ANOVA, which of the following is computed differently, compared to an independent-measures ANOVA?

- a. the denominator of the F-ratio
- b. between treatment SS
- c. total SS
- d. within treatment SS

---

10. The appropriate denominator for the F-ratio for a repeated-measures ANOVA is:

- a. remaining variance when the variance within treatments is subtracted from the variance between subjects.
- b. remaining variance when the variance between subjects is subtracted from the variance within treatments.
- c. variance within treatments.
- d. variance between subjects.