

## Exercises

### Clarifying the Concepts

- 10.1** When is it appropriate to use an independent-samples  $t$  test?
- 10.2** Explain random assignment and what it controls.
- 10.3** What are independent events?
- 10.4** Explain how the paired-samples  $t$  test evaluates individual differences and the independent-samples  $t$  test evaluates group differences.
- 10.5** As they relate to comparison distributions, what is the difference between *mean differences* and *differences between means*?
- 10.6** As measures of variability, what is the difference between standard deviation and variance?
- 10.7** What is the difference between  $s_X^2$  and  $s_Y^2$ ?
- 10.8** What is pooled variance?
- 10.9** Why would we want the variability estimate based on a larger sample to count more (to be more heavily weighted) than one based on a smaller sample?
- 10.10** Define the symbols in the following formula:  $s_{\text{difference}}^2 = s_{M_X}^2 + s_{M_Y}^2$
- 10.11** How do confidence intervals relate to margin of error?
- 10.12** What is the difference between pooled variance and pooled standard deviation?
- 10.13** How does the size of the confidence interval relate to the precision of our prediction?
- 10.14** Why does the effect-size calculation use standard deviation rather than standard error?
- 10.15** How do we interpret effect size using Cohen's  $d$ ?

### Calculating the Statistics

- 10.16** Below are several pairs of sample means. Calculate the differences between the means for students who sit in the front versus the back of a classroom for each of these four classes.

Mean Test Grades	Students in the Front	Students in the Back
Class 1	82	78
Class 2	79.5	77.41
Class 3	71.5	76
Class 4	72	71.3

- 10.17** Calculate  $s^2$  for the following data:

Group 1: 97, 83, 105, 102, 92

Group 2: 111, 103, 96, 106

- 10.18** Calculate  $s^2$  for the following data:

Liberals: 2, 1, 3, 2

Conservatives: 4, 3, 3, 5, 2, 4

- 10.19** Assuming these data are from two independent groups, calculate  $df_X$ ,  $df_Y$ , and  $df_{\text{total}}$  for the data presented in Exercise 10.17.
- 10.20** Assuming these data are from two independent groups, calculate  $df_X$ ,  $df_Y$ , and  $df_{\text{total}}$  for the data presented in Exercise 10.18.
- 10.21** Determine the critical values for  $t$  based on the  $df$  you calculated in Exercise 10.19, assuming a two-tailed test with a  $p$  level of 0.05.
- 10.22** Determine the critical values for  $t$  based on the  $df$  you calculated in Exercise 10.20, assuming a two-tailed test with a  $p$  level of 0.05.
- 10.23** Calculate the pooled variance,  $s_{\text{pooled}}^2$ , for groups 1 and 2 shown in Exercise 10.17.
- 10.24** Calculate the pooled variance,  $s_{\text{pooled}}^2$ , for the data from liberals and conservatives shown in Exercise 10.18.
- 10.25** Calculate the variance version of standard error for each sample in Exercise 10.17—for group 1 (97, 83, 105, 102, 92) and then again for group 2 (111, 103, 96, 106).
- 10.26** Calculate the variance version of standard error for each sample in Exercise 10.18—for the liberals (2, 1, 3, 2) and then for the conservatives (4, 3, 3, 5, 2, 4).
- 10.27** Using your work in Exercise 10.25, calculate the variance and the standard deviation of the distribution of differences between means for the data in groups 1 and 2.
- 10.28** Using your work in Exercise 10.26, calculate the variance and the standard deviation of the distribution of differences between means for the data from liberals and conservatives.
- 10.29** Calculate the  $t$  statistic for the data presented in Exercise 10.17.
- 10.30** Calculate the  $t$  statistic for the data presented in Exercise 10.18.
- 10.31** Calculate the 95% confidence interval for the data presented in Exercise 10.17.
- 10.32** Calculate the 95% confidence interval for the data presented in Exercise 10.18.
- 10.33** Calculate the effect size using Cohen's  $d$  for the data presented in Exercise 10.17.
- 10.34** Calculate the effect size using Cohen's  $d$  for the data presented in Exercise 10.18.