

24. Tobacco and Alcohol in Children's Movies Refer to Data Set 8 in Appendix B and use the times (seconds) that animated Disney movies showed the use of tobacco and the times that they showed the use of alcohol. Use a 0.05 significance level to test the claim that the mean of the differences is greater than 0 sec so that more time is devoted to showing tobacco than alcohol. For animated children's movies, how much time should be spent showing the use of tobacco and alcohol?

9-4 Beyond the Basics

25. Freshman 15 The “Freshman 15” refers to the urban legend that is the common belief that students gain an average of 15 lb (or 6.8 kg) during their freshman year. Refer to Data Set 4 in Appendix B and consider the sample values in this format: (April weight) – (September weight). In this format, positive differences represent *gains* in weight, and negative differences represent *losses* of weight. If we use μ_d to denote the mean of the “April – September” differences in weights of college students during their freshman year, the “Freshman 15” is the claim that $\mu_d = 15$ lb or $\mu_d = 6.8$ kg. Test the claim that $\mu_d = 6.8$ kg using a 0.05 significance level with the 67 subjects from Data Set 4 in Appendix B. What do these results suggest about the “Freshman 15”?

9-5 Two Variances or Standard Deviations

Key Concept In this section we present the F test for testing claims made about two population variances (or standard deviations). The F test (named for statistician Sir Ronald Fisher) uses the F distribution introduced in this section. The F test requires that both populations have normal distributions. This test is *very* sensitive to departures from normal distributions, so the normality requirement is quite strict. Part 1 describes the F test procedure for conducting a hypothesis test, and Part 2 gives a brief description of two alternative methods for comparing variation in two samples.

Part 1: F Test as a Hypothesis Test with Two Variances or Standard Deviations

The following box includes key elements of a hypothesis test of a claim about two population variances or two population standard deviations. The procedure is based on use of the two sample variances, but the same procedure is used for claims made about two population variances or two population standard deviations.

The actual F test could be two-tailed, left-tailed, or right-tailed, but we can make computations much easier by stipulating that the larger of the two sample variances is denoted by s_1^2 . It follows that the smaller sample variance is denoted as s_2^2 . This stipulation of denoting the larger sample variance by s_1^2 allows us to avoid the somewhat messy problem of finding a critical value of F for the left tail.

Objective

Conduct a hypothesis test of a claim about two population variances or standard deviations. (Any claim made about two population standard deviations can be restated

with an equivalent claim about two population variances, so the same procedure is used for two population standard deviations or two population variances.)

continued