

deviation of 0.01648 g. U.S. Mint specifications require that pennies be manufactured so that the mean weight is 2.500 g. A hypothesis test will verify that the sample appears to come from a population with a mean of 2.500 g as required, but use a 0.05 significance level to test the claim that the population of weights has a *standard deviation* less than the specification of 0.0230 g.

8. Weights of Pennies The preceding exercise involved the claim that *post*-1983 pennies have weights with a standard deviation less than 0.0230 g. Data Set 21 in Appendix B includes the weights of a simple random sample of 35 *pre*-1983 pennies, and that sample has a standard deviation of 0.03910 g. Use a 0.05 significance level to test the claim that *pre*-1983 pennies have weights with a standard deviation greater than 0.0230 g. Does it appear that weights of *pre*-1983 pennies vary more than those of *post*-1983 pennies?

9. Pulse Rates of Men A simple random sample of 40 men results in a standard deviation of 10.3 beats per minute (based on Data Set 1 in Appendix B). The normal range of pulse rates of adults is typically given as 60 to 100 beats per minute. If the range rule of thumb is applied to that normal range, the result is a standard deviation of 10 beats per minute. Use the sample results with a 0.05 significance level to test the claim that pulse rates of men have a standard deviation equal to 10 beats per minute.

10. Pulse Rates of Women Repeat the preceding exercise using the pulse rates of women listed in Data Set 1 of Appendix B. For this sample, $n = 40$ and $s = 11.6$ beats per minute.

11. Cigarette Tar A simple random sample of 25 filtered 100-mm cigarettes is obtained, and the tar content of each cigarette is measured. The sample has a standard deviation of 3.7 mg (based on Data Set 10 in Appendix B). Use a 0.05 significance level to test the claim that the tar content of filtered 100-mm cigarettes has a standard deviation different from 3.2 mg, which is the standard deviation for unfiltered king-size cigarettes.

12. Analysis of Pennies In an analysis investigating the usefulness of pennies, the cents portions of 100 randomly selected credit card charges from the author are recorded, and they have a mean of 47.6 cents and a standard deviation of 33.5 cents. If the amounts from 0 cents to 99 cents are all equally likely, the mean is expected to be 49.5 cents and the population standard deviation is expected to be 28.866 cents. Use a 0.01 significance level to test the claim that the sample is from a population with a standard deviation equal to 28.866 cents. If the amounts from 0 cents to 99 cents are all equally likely, is the requirement of a normal distribution satisfied? If not, how does that affect the conclusion?

13. Ages of Race Car Drivers Listed below are the ages (years) of randomly selected race car drivers (based on data reported in *USA Today*). Most people in the general population have ages that vary between 0 and 90 years, so use of the range rule of thumb suggests that ages in the general population have a standard deviation of 22.5 years. Use a 0.01 significance level to test the claim that the standard deviation of ages of all race car drivers is less than 22.5 years.

32 32 33 33 41 29 38 32 33 23 27 45 52 29 25

14. Highway Speeds Listed below are speeds (mi/h) measured from southbound traffic on I-280 near Cupertino, California (based on data from SigAlert). This simple random sample was obtained at 3:30 P.M. on a weekday. Use a 0.05 significance level to test the claim of the highway engineer that the standard deviation of speeds is equal to 5.0 mi/h.

62 61 61 57 61 54 59 58 59 69 60 67

15. Aircraft Altimeters The Skytek Avionics company uses a new production method to manufacture aircraft altimeters. A simple random sample of new altimeters resulted in the errors listed below. Use a 0.05 level of significance to test the claim that the new production method has errors with a standard deviation greater than 32.2 ft, which was the standard