19. The sample data meet the loose requirement of having a normal distribution. CI: 0.707 W/kg $< \mu <$ 1.169 W/kg. Because the confidence interval is entirely below the standard of 1.6 W/kg, it appears that the mean amount of cell phone radiation is less than the FCC standard, but there could be individual cell phones that exceed the standard.
21. The sample data meet the loose requirement of having a normal distribution. CI: $6.43 < \mu < 15.67$. We cannot conclude that the population mean is less than 7 μg/g, because the confidence interval shows that the mean might be greater than that level.
23. CI for ages of unsuccessful applicants: 43.8 years $< \mu <$ 50.1 years. CI for ages of successful applicants: 42.6 years $< \mu <$ 46.4 years. Although final conclusions about means of populations should not be based on the overlapping of confidence intervals, the confidence intervals do overlap, so it appears that both populations could have the same mean, and there is not clear evidence of discrimination based on age.
25. The sample size is 68, and it does appear to be very reasonable.
27. 405 (Tech: 403). It is not likely that you would find that many two-year-old used Corvettes in your region.
29. Use $\sigma = 450$ to get a sample size of 110. The margin of error of 100 points seems too high to provide a good estimate of the mean SAT score.
31. With the range rule of thumb, use $\sigma = 11$ to get a required sample size of 117. With $\sigma = 10.3$, the required sample size is 102. The better estimate of σ is the standard deviation of the sample, so the correct sample size is likely to be closer to 102 than 117.
33. $0.963 < \mu < 1.407$
35. 8.156 km $< \mu <$ 11.460 km (Tech: 8.159 km $< \mu <$ 11.457 km)
37. 6131.8 thousand dollars $< \mu <$ 19,663.4 thousand dollars (Tech: 6131.9 thousand dollars $< \mu <$ 19,663.3 thousand dollars)
39. The sample data do not appear to meet the loose requirement of having a normal distribution. CI: $-24.54 < \mu < 106.04$ (Tech: $-24.55 < \mu < 106.05$). The effect of the outlier on the confidence interval is very substantial. Outliers should be discarded if they are known to be errors. If an outlier is a correct value, it might be very helpful to see its effects by constructing the confidence interval with and without the outlier included.
41. $-26.0 < \mu < 32.0$. The confidence interval based on the first sample value is much wider than the confidence interval based on all 10 sample values.

Section 7-4

1. 30.3 mg/dL $< \sigma <$ 47.5 mg/dL. We have 95% confidence that the limits of 30.3 mg/dL and 47.5 mg/dL contain the true value of the standard deviation of the LDL cholesterol levels of all women.
3. The original sample values can be identified, but the dotplot shows that the sample appears to be from a population having a uniform distribution, not a normal distribution as required. Because the normality requirement is not satisfied, the confidence interval estimate of σ should not be constructed using the methods of this section.
5. df = 24. $\chi^2_L = 9.886$ and $\chi^2_R = 45.559$. CI: 0.17 mg $< \sigma <$ 0.37 mg.
7. df = 39. $\chi^2_L = 24.433$ (Tech: 23.654) and $\chi^2_R = 59.342$ (Tech: 58.120). CI: $52.9 < \sigma < 82.4$ (Tech: $53.4 < \sigma < 83.7$).
9. 0.579°F $< \sigma <$ 0.720°F (Tech: 0.557°F $< \sigma <$ 0.700°F)
11. 30.9 mL $< \sigma <$ 67.45 mL. The confidence interval shows that the standard deviation is not likely to be less than 30 mL, so the variation is too high instead of being at an acceptable level below 30 mL. (Such one-sided claims should be tested using the formal methods presented in Chapter 8.)
13. 0.252 ppm $< \sigma <$ 0.701 ppm
15. CI for ages of unsuccessful applicants: 5.2 years $< \sigma <$ 11.5 years. CI for ages of successful applicants: 3.7 years $< \sigma <$ 7.5 years. Although final conclusions about means of populations should not be based on the overlapping of confidence intervals, the confidence intervals do overlap, so it appears that the two populations have standard deviations that are not dramatically different.
17. 0.01239 g $< \sigma <$ 0.02100 g (Tech: 0.01291 g $< \sigma <$ 0.02255 g)
19. 33,218 is too large. There aren't 33,218 statistics professors in the population, and even if there were, that sample size is too large to be practical.
21. The sample size is 768. Because the population does not have a normal distribution, the computed minimum sample size is not likely to be correct.
23. $\chi^2_L = 82.072$ and $\chi^2_R = 129.635$ (Tech using $z_{\alpha/2} = 1.644853626$: $\chi^2_L = 82.073$ and $\chi^2_R = 129.632$). The approximate values are quite close to the actual critical values.

Chapter 7: Quick Quiz

1. $36.9\% < p < 43.1\%$
2. 0.480
3. We have 95% confidence that the limits of 0.449 and 0.511 contain the true value of the proportion of females in the population of medical school students.
4. $z = 1.645$
5. 752
6. 373 (Tech: 374)
7. The sample must be a simple random sample and there is a loose requirement that the sample values appear to be from a normally distributed population.
8. The degrees of freedom is the number of sample values that can vary after restrictions have been imposed on all of the values. For the sample data in Exercise 7, df = 5.
9. $t = 2.571$
10. $\chi^2_L = 0.831$ and $\chi^2_R = 12.833$

Chapter 7: Review Exercises

1. a. 51.0% b. $46.8\% < p < 55.1\%$
   c. No, the confidence interval shows that the population percentage might be 50% or less, so we cannot safely conclude that the majority of adults say that they are underpaid.
2. 4145 (Tech: 4147) 3. 155 (Tech: 154)
4. a. Student t distribution b. Normal distribution
   c. The distribution is not normal, Student t, or chi-square.
   d. χ^2 (chi-square distribution) e. Normal distribution