7. $0.02 < P$-value < 0.05 (Tech: 0.0365).
9. H_0: $\mu = 24$. H_1: $\mu < 24$. Test statistic: $t = -7.323$. Critical value: $t = -1.685$. P-value < 0.005. (The display shows that the P-value is 0.00000000387325.) Reject H_0. There is sufficient evidence to support the claim that Chips Ahoy reduced-fat cookies have a mean number of chocolate chips that is less than 24 (but this does not provide conclusive evidence of reduced fat).
11. H_0: $\mu = 33$ years. H_1: $\mu \neq 33$ years. Test statistic: $t = 2.367$. Critical values: $t = \pm 2.639$ (approximately). P-value > 0.02 (Tech: 0.0204). Fail to reject H_0. There is not sufficient evidence to warrant rejection of the claim that the mean age of actresses when they win Oscars is 33 years.
13. H_0: $\mu = 0.8535$ g. H_1: $\mu \neq 0.8535$ g. Test statistic: $t = 0.765$. Critical values: $t = \pm 2.101$. P-value > 0.20 (Tech: 0.4543). Fail to reject H_0. There is not sufficient evidence to warrant rejection of the claim that the mean weight of all green M&Ms is equal to 0.8535 g. The green M&Ms do appear to have weights consistent with the package label.
15. H_0: $\mu = 0$ lb. H_1: $\mu > 0$ lb. Test statistic: $t = 3.872$. Critical value: $t = 2.426$. P-value < 0.005 (Tech: 0.0002). Reject H_0. There is sufficient evidence to support the claim that the mean weight loss is greater than 0. Although the diet appears to have statistical significance, it does not appear to have practical significance, because the mean weight loss of only 3.0 lb does not seem to be worth the effort and cost.
17. H_0: $\mu = 0$. H_1: $\mu > 0$. Test statistic: $t = 0.133$. Critical value: $t = 1.676$ (approximately, assuming a 0.05 significance level). P-value > 0.10 (Tech: 0.4472). Fail to reject H_0. There is not sufficient evidence to support the claim that with garlic treatment, the mean change in LDL cholesterol is greater than 0. The results suggest that the garlic treatment is not effective in reducing LDL cholesterol levels.
19. H_0: $\mu = 4$ years. H_1: $\mu > 4$ years. Test statistic: $t = 3.189$. Critical value: $t = 2.539$. P-value < 0.005 (Tech: 0.0024). Reject H_0. There is sufficient evidence to support the claim that the mean time required to earn a bachelor's degree is greater than 4.0 years. Because $n \leq 30$ and the data do not appear to be from a normally distributed population, the requirement that "the population is normally distributed or $n > 30$" is not satisfied, so the conclusion from the hypothesis test might not be valid. However, some of the sample values are equal to 4 years and others are greater than 4 years, so the claim does appear to be justified.
21. The sample data meet the loose requirement of having a normal distribution. H_0: $\mu = 14$ μg/g. H_1: $\mu < 14$ μg/g. Test statistic: $t = -1.444$. Critical value: $t = -1.833$. P-value > 0.05 (Tech: 0.0913). Fail to reject H_0. There is not sufficient evidence to support the claim that the mean lead concentration for all such medicines is less than 14 μg/g.
23. The sample data meet the loose requirement of having a normal distribution. H_0: $\mu = 63.8$ in. H_1: $\mu > 63.8$ in. Test statistic: $t = 23.824$. Critical value: $t = 2.821$. P-value < 0.005 (Tech: 0.0000). Reject H_0. There is sufficient evidence to support the claim that supermodels have heights with a mean that is greater than the mean height of 63.8 in. for women in the general population. We can conclude that supermodels are taller than typical women.
25. H_0: $\mu = 1.00$. H_1: $\mu > 1.00$. Test statistic: $t = 2.218$. Critical value: $t = 1.676$ (approximately). P-value < 0.025 (Tech: 0.0156). Reject H_0. There is sufficient evidence to support the claim that the population of earthquakes has a mean magnitude greater than 1.00.
27. H_0: $\mu = 83$ kg. H_1: $\mu < 83$ kg. Test statistic: $t = -5.524$. Critical value: $t = -2.453$. P-value < 0.005 (Tech: 0.0000). Reject H_0. There is sufficient evidence to support the claim that male college students have a mean weight that is less than the 83 kg mean weight of males in the general population.
29. H_0: $\mu = 24$. H_1: $\mu < 24$. Test statistic: $z = -7.32$. Critical value: $z = -1.645$. P-value: 0.0001 (Tech: 0.0000). Reject H_0. There is sufficient evidence to support the claim that Chips Ahoy reduced-fat cookies have a mean number of chocolate chips that is less than 24 (but this does not provide conclusive evidence of reduced fat).
31. H_0: $\mu = 33$ years. H_1: $\mu \neq 33$ years. Test statistic: $z = 2.37$. Critical values: $z = \pm 2.575$. P-value: 0.0178 (Tech: 0.0180). Fail to reject H_0. There is not sufficient evidence to warrant rejection of the claim that the mean age of actresses when they win Oscars is 33 years.
33. The approximation yields a critical value of $t = 1.655$, which is the same as the result from STATDISK or a TI-83/84 Plus calculator.
35. a. The power of 0.4274 shows that there is a 42.74% chance of supporting the claim that $\mu < 1.00$ W/kg when the true mean is actually 0.80 W/kg. This value of power is not very high, and it shows that the hypothesis test is not very effective in recognizing that the mean is less than 1.00 W/kg when the actual mean is 0.80 W/kg.
    b. $\beta = 0.5726$. The probability of a type II error is 0.5726. That is, there is a 0.5726 probability of making the mistake of not supporting the claim that $\mu < 1.00$ W/kg when in reality the population mean is 0.80 W/kg.

Section 8-5

1. a. The mean waiting time remains the same.
   b. The variation among waiting times is lowered.
   c. Because customers all have waiting times that are roughly the same, they experience less stress and are generally more satisfied. Customer satisfaction is improved.
   d. The single line is better because it results in lower variation among waiting times, so a hypothesis test of a claim of a lower standard deviation is a good way to verify that the variation is lower with a single waiting line.
3. Use a 90% confidence interval. The conclusion based on the 90% confidence interval will be the same as the conclusion from a hypothesis test using the P-value method or the critical value method.
5. H_0: $\sigma = 0.15$ oz. H_1: $\sigma < 0.15$ oz. Test statistic: $\chi^2 = 18.822$. Critical value of χ^2 is between 18.493 and 26.509, so it is estimated to be 22.501 (Tech: 22.465). P-value < 0.05 (Tech: 0.0116). Reject H_0. There is sufficient evidence to support the claim that the population of volumes has a standard deviation less than 0.15 oz.