**Section 10.6**

**5.** Solve $7^x = 5$. Note that $\log(7^x) = \log 5$, so $x \log 7 = \log 5$, and thus $x = \frac{\log 5}{\log 7} \approx .827087$.

**7.** Solve $9^{-x+2} = 13$. Note that $\log(9^{-x+2}) = \log 13$, so $(-x+2)\log 9 = \log 13$. It follows that $-x + 2 = \frac{\log 13}{\log 9}$, and thus $x = 2 - \frac{\log 13}{\log 9}$.

**13.** Solve $2^{x+3} = 3^{x-4}$. Note that $(x+3)\log 2 = (x-4)\log 3$, and thus $x(\log 3 - \log 2) = 3\log 2 + 4\log 3 = \log(2^3 3^4) = \log 648$. This means that $x = \frac{\log 648}{\log 3 - \log 2} \approx 15.9665$.

**21.** Solve $\ln(e^{.45x}) = 7^{1/2}$. Note that $\ln(e^{.45x}) = .45x \ln e = .45x(1) = .45x$. Therefore, we must solve $.45x = \sqrt{7}$, so the answer is $x = \sqrt{7}/.45$.

**28.** Solve $\log_4(4x+2) = 2$. It is a good idea to rewrite this as $4^2 = 4x + 2$. Therefore, $4x = 14$, and $x = \frac{14}{4}$.

**31.** If $x = 2$, then the expression $\log(x-3)$ really stands for $\log(-1)$, which is undefined.

**44.** Solve $\log_2 x + \log_2(x+4) = 5$. Using log properties, I get $\log_2(x(x+4)) = 5$, and this is equivalent to writing $2^5 = x(x+4)$. So we have $x^2 + 4x = 32$, and this means that $x^2 + 4x - 32 = 0$, which can be written as $(x+8)(x-4) = 0$. This means that $x = -8$ and $x = 4$ are candidates to be solutions. However, $x = -8$ can't be a solution because $\log(-8)$ (and for that matter $\log(-8+4)$) don't exist. So $x = 4$ is the only solution.

**47.** (a) What amount $A$ will be in an account with an initial principal of $4,000 if interest is compounded continuously at an annula rate of 3.5% for 6 years?
**Answer (a)** Note that $A = 3,000e^{.035t}$ models this situation, and we have $t = 6$. Thus $A = 3,000e^{.035(6)} \approx$. **(b)** How long will it take for the initial amount to double?
**Answer (b)** We set $6000 = 3000e^{.035t}$. To solve this, first divide both sides by 3000 to get $2 = e^{.035t}$. Then $\ln 2 = \ln(e^{.035t}) = .035t$. Therefore, $t = \frac{\ln 2}{.035} \approx 19.804$ years.

**51.** How much money must be deposited today to amount to $1,850 in 40 years at 6.5% compounded continuously?
**Answer:** We must solve $1850 = P_0 e^{.065(40)}$. This means that $P_0 = \frac{1850}{e^{.065(40)}} = 1850(e^{-.065(40)}) \approx$ $137.41