8 Chapter Self-Test

1. Write the equation of the inverse of each function in both exponential and logarithmic form.
   a) $y = 4^x$
   b) $y = \log_6 x$
2. State the transformations that must be applied to $f(x) = \log x$ to graph $g(x)$.
   a) $g(x) = \log[2(x - 4)] + 3$
   b) $g(x) = -\frac{1}{2}\log(x + 5) - 1$
3. Evaluate.
   a) $\log_3 \frac{1}{9}$
   b) $\log_5 100 - \log_5 4$
4. Evaluate.
   a) $\log 15 + \log 40 - \log 6$
   b) $\log_7 343 + 2\log_7 49$
5. Express $\log_4 x^2 + 3\log_4 y^{\frac{1}{3}} - \log_4 x$ as a single logarithm. Assume that x and y represent positive numbers.
6. Solve $5^{x+2} = 6^{x+1}$. Round your answer to three decimal places.
7. Solve.
   a) $\log_4(x + 2) + \log_4(x - 1) = 1$
   b) $\log_3(8x - 2) + \log_3(x - 1) = 2$
8. Carbon-14 is used by scientists to estimate how long ago a plant or animal lived. The half-life of carbon-14 is 5730 years. A particular plant contained 100 g of carbon-14 at the time that it died.
   a) How much carbon-14 would remain after 5730 years?
   b) Write an equation to represent the amount of carbon-14 that remains after t years.
   c) After how many years would 80 g of carbon-14 remain?
   d) Estimate the instantaneous rate of change at 100 years.
9. The equation that models the amount of time, t, in minutes that a cup of hot chocolate has been cooling as a function of its temperature, T, in degrees Celsius is $t = \log\left(\frac{T - 22}{75}\right) \div \log(0.75)$. Calculate the following.
   a) the cooling time if the temperature is 35 °C
   b) the initial temperature of the drink