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### Exponential and Logarithmic Functions (2)

1. Express each of the following in logarithmic form.

a.  $27^{\frac{5}{6}} = 9\sqrt{3}$

b.  $2^{-6} = 1/64$

2. Express each of the following in exponential form.

a.  $\log_{25}\left(\frac{1}{625}\right) = -2$

b.  $\log_{16}(4\sqrt{2}) = \frac{5}{8}$

3. Describe the transformations that would be applied to the parent function  $y = \log_2(x)$  to obtain the graph of  $y = f(x)$ . Sketch the graph of the transformed function and state the domain, the range, and the equation of the asymptote.

a.  $f(x) = 2\log_2(x) - 3$

b.  $f(x) = -3\log_2(x-2) + 1$

4. For the function,  $y = g(x)$ , determine the equation of  $y = g^{-1}(x)$ .

$$g(x) = -\log_3\left(\frac{1}{2}x - 3\right) + 4$$

5. Simplify, then evaluate without using a calculator.

a.  $\log_6(18) + \log_6(2)$

b.  $\log_2(56) - \log_2(7)$

c.  $\log(4) - 4\log(2) - \log(25)$

d.  $5^{2\log_5 6}$

e.  $3\log_5(10) - \log_5(40)$

f.  $\log_4(24) - 2\log_4(3) + 0.5\log_4(144)$

g.  $(\log_3(216)) / (\log_3(6))$

h.  $9^{\log_3(12) - \log_3(3)}$

**6.** Identify the restrictions on  $x$ . Convert each equation to the equivalent exponential form and solve for  $x$ .

a.  $\log_8\left(\frac{1}{16\sqrt{2}}\right) = x$

b.  $\log_3(4x+6) = 2$

c.  $\log(3x-2) = 1$

d.  $\log_x(16) = -2$

**7.** Solve. Check for extraneous roots.

a.  $\log_5(2x-7) = \log_5(x) - \log_5(4)$

b.  $\log(x) + \log(x-4) = \log(12)$

c.  $2\log_2(x) = \log_2(3) + \log_2(12)$

d.  $2(5^{6x}) - 9(5^{4x}) + 10(5^{2x}) - 3 = 0$

e.  $\log_3(x) + \log_2(x) = 5$

f.  $\log(\log x) = 0$

**8.** A \$1000 investment earns interest at a rate of 4.2% per annum, compounded monthly. Another investment of \$1600 earns interest at a rate of 3.6% per annum, compounded semi-annually. How long, if ever, will it take for the lower initial investment to be worth more than the higher one?