

**Section 12.1: Inverse Functions**

If the function  $f(x)$  is one-to-one, find the inverse  $f^{-1}(x)$ . Otherwise find  $x_1 \neq x_2$  such that  $f(x_1) = f(x_2)$ .

1.  $f(x) = 2x^3 - 3$

2.  $f(x) = 3 - 4x^2$

**Section 12.2: Exponential Functions**

1. Solve for  $x$ :  $3^{x-4} = 81^{x+2}$

2. Graph:  $f(x) = 5^{x-2}$ . Label 3 coordinates on your graph.

**Section 12.3: Logarithmic Functions**

1. Solve for  $x$ :  $\log_4(2x + 4) = 3$

2. Solve for  $x$ :  $\log_x \frac{1}{10} = -1$

**Section 12.4: Properties of Logarithms**

1. True or False? Justify your answer:  $\log_3 8 + \log_3 \frac{1}{8} = 0$

2. Rewrite the expressions as one logarithm if possible, and simplify. Assume  $b > 0, b \neq 1$  and all other variables are positive.

$$-3\log_b x + \frac{1}{3}\log_b y + \frac{3}{2}\log_b x + \frac{2}{3}\log_b y$$

### Section 12.5: Common and Natural Logarithms

1. The **pH** of a substance is given by  $\text{pH} = -\log[H_3O^+]$  where  $H_3O^+$  is the hydronium ion concentration in moles per liter. Acids have a **pH** number  $< 7$  and alkaline substances have a **pH** number  $> 7$ . If a certain tuna has a hydronium ion concentration of  $1.3 \times 10^{-6}$  moles per liter, find out if the tuna is acidic or alkaline.

### Section 12.6: Exponential and Logarithmic Equations; Further Applications

1. Solve for  $x$ :  $\log(x + 5) = \log(3) + \log(x - 1)$
2. Solve for  $x$ :  $7^{x-4} = 5^{x+2}$
3. How much money must be deposited today to amount to \$5000 in 13 years at 4% compounded continuously?
4. How much money will be there in an account at the end of 7 years if \$3000 is deposited at 4% compounded monthly. When will the amount grow to \$5000?