

Name _____ Date _____ Period _____

Worksheet 4.3—Logarithmic Functions

Show all work on a separate sheet of paper. All answers must be given as either simplified, exact answers. No calculator is permitted unless otherwise stated.

Multiple Choice

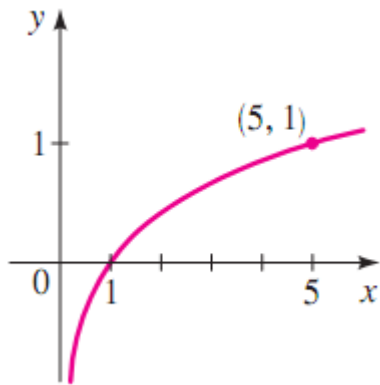
- (Calculator permitted) What is the approximate value of the common log of 2?
(A) 0.10523 (B) 0.20000 (C) 0.30103 (D) 0.69315 (E) 3.32193
- (Calculator permitted) Which statement is false?
(A) $\log 5 = 2.5 \log 2$ (B) $\log 5 = 1 - \log 2$ (C) $\log 5 > \log 2$
(D) $\log 5 < \log 10$ (E) $\log 5 = \log 10 - \log 2$
- Which statement is false about $f(x) = \ln x$?
(A) It is monotonic increasing (B) It is an odd function (C) It is continuous over its domain
(D) Its range is all real numbers (E) It has a vertical asymptote
- Which of the following is the inverse of $f(x) = 2 \cdot 3^x$?
(A) $f^{-1}(x) = \log_3 \left(\frac{x}{2} \right)$ (B) $f^{-1}(x) = \log_3 \left(\frac{x}{3} \right)$ (C) $f^{-1}(x) = 2 \log_3 x$
(D) $f^{-1}(x) = 3 \log_2 x$ (E) $f^{-1}(x) = 0.5 \log_3 x$

Short Answer

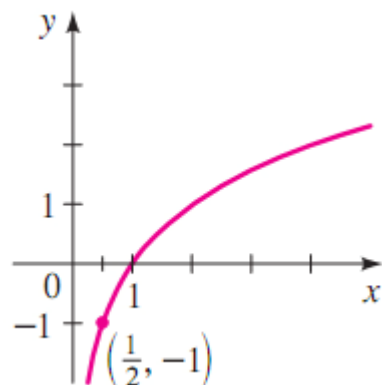
- Express each of the following equations in exponential form.
(a) $\log 0.1 = -1$ (b) $\ln y = 5$ (c) $\log_2(x-1) = 4$
- Express each of the following equations in logarithmic form.
(a) $4^{-3/2} = 0.125$ (b) $e^x = 2$ (c) $7^3 = 343$
- Evaluate the following expressions.
(a) $\log_{49} 7$ (b) $2^{\log_2 37}$ (c) $e^{\ln \sqrt{7}}$ (d) $\log_4 \sqrt{2}$ (e) $\log_4 8$ (f) $\log_6 1$ (g) $\ln \left(\frac{1}{e} \right)$
- Solve for x in each of the following equations.
(a) $\log_2 16 = x$ (b) $\log_5(2x-1) = 2$ (c) $\log_x 16 = 4$ (d) $\log_2(\log_9 x) = -1$
- Use a calculator and possibly the change of base formula to evaluate the following correct to 3 decimal places.
(a) $\log(3\sqrt{2})$ (b) $\ln(\log 20)$ (c) $\log_6 13$ (d) $\frac{\log_{1/2} 5}{\log_5 e}$

10. Find the equation of the function of the $y = \log_b x$ whose graph is given below.

(a)



(b)



11. Find the domain of each of the following functions:

(a) $f(x) = \log_6(8 - 2x)$

(b) $f(x) = \ln x + \ln(2 - x)$

(c) $f(x) = \log_4(x - x^2)$

(d) $k(x) = \sqrt{x - 2} - \log_5(10 - x)$

(e) $f(x) = \frac{5}{\ln(x^2 - 1)}$

12. For each of the following functions, find the domain then find the inverse function $f^{-1}(x)$.

(a) $f(x) = \log_2(\log x)$

(b) $f(x) = \ln(\ln(\ln x))$

13. (Calculator permitted) The Beer-Lambert Law of absorption gives the light intensity I (in lumens), in water at a depth of x feet, and is modeled by $\log_{12} \frac{I}{12} = -0.00235x$. What is the intensity of the light at a depth of 30 feet? At what depth is the intensity 5 lumens?