

# Logarithms

## Problem Set 9

1. Write the following powers in logarithmic form.

(a)  $4^2 = 16$

(b)  $3^4 = 81$

(c)  $2^5 = 32$

(d)  $49^{\frac{1}{2}} = 7$

2. Find the value of x.

(a)  $\log_3(x) = 2$

(c)  $\log_4(x + 1) = 2$

(e)  $\log_x(49) = 2$

(b)  $\log_4(x) = \frac{1}{2}$

(d)  $\log_2\left(\frac{x}{7}\right) = 3$

(f)  $\log_x(81) = 4$

3. Simplify

(a)  $\log_3(5) + \log_3(7)$

(b)  $\log_5(2) + \log_5(3) + \log_8(2) + \log_8(3)$

(c)  $\log_4(x) + \log_4(17)$

4. Simplify

(a)  $\log_3(5) - \log_3(7)$

(b)  $\log_5(12) - \log_5(3) + \log_5(2)$

(c)  $\log_4(x^2) - \log_4(3x)$

5. Rewrite the following expressions using the rule  $\log_b(A)^n = n \log_b(A)$ .

(a)  $\log_3(x^4)$

(b)  $\log_3(16x^4)$

(c)  $5 \log_7(2x)$

6. Evaluate

(a)  $\log_7 49$

(c)  $\log_5 \sqrt{125}$

(e)  $\log_5(-25)$

(b)  $\log_3\left(\frac{1}{27}\right)$

(d)  $\sqrt{\log_5 125}$

(f)  $\log_{10}(0.001)$

7. Simplify

(a)  $\log_2 x + 4 \log_2(3x)$

(b)  $\frac{1}{3} \log_a 5 - 3 \log_a x - 4 \log_a y$

(c)  $\log_4 \frac{x^4}{y^2} - \log_4 \frac{y^2}{x}$

(d)  $\log_3(x + 1) + \log_3 y - \log_3 xy$

(e)  $\log_b(x^2 - y^2) - \log_b(x - y) - \log_b(x + y)$

8. Solve

- (a)  $\log_5 x = \log_5 3 - \log_5 2$
- (b)  $2\log_7 3 + \log_7 4 - \log_7 6 = \log_7 x$
- (c)  $\log_b(x + 1) + \log_b 3 = \log_b 10$
- (d)  $2\log_b x = \log_b 4$
- (e)  $2\log_b x = \log_b(3x + 4)$
- (f)  $\log_2(x + 1) - \log_2 x = 3$

9. Simplify

- (a)  $\log_e e^2$
- (b)  $\ln(x^2) - \ln(xy)$

10. Solve

- (a)  $2\ln(x) = \ln(3x + 10)$
- (b)  $\ln(x + 3) = 4$
- (c)  $e^{x+1} = 2$
- (d)  $5e^x = 12$
- (e)  $5^x = 23$
- (f)  $7^x = 15$

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Ans: 1a)  $\log_4(16) = 2$ , b)  $\log_3(81) = 4$ , c)  $\log_2(32) = 5$ , d)  $\log_{49}(7) = \frac{1}{2}$ , 2a) 9, b) 2, c) 15, d) 56, e) 7, f) 3, 3a)  $\log_3(35)$ , b)  $\log_5(6) + \log_8(6)$ , c)  $\log_4(17x)$ , 4a)  $\log_3(\frac{5}{7})$ , b)  $\log_5(8)$ , c)  $\log_4(\frac{x}{3})$ , 5a)  $4\log_3(x)$ , b)  $4\log_3(2x)$ , c)  $\log_7(32x^5)$ ,