Evaluating Logs and Log Properties (2.9+2.12) Homework

Evaluate each of the following logarithmic expressions.

1. $\log_2 32$
2. $\log(1000)$
3. $\log_3(81)$
4. $\log_5\left(\frac{1}{125}\right)$
5. $\log_6\left(\sqrt{\frac{1}{6}}\right)$
6. $\log_9\left(\sqrt{3}\right)$
7. $\log_6 1$
8. $\ln(e^5)$
9. $\log_4(32)$
10. $\log_4\left(\frac{1}{8}\right)$
11. $\ln(1)$
12. $\log_{25}\left(\frac{1}{5}\right)$

13. Use change of base formula to rewrite the logs in the following expression as all natural logs. Then, evaluate the expression using log properties.

$$(\log_9 16)(\log_{25} 27)(\log_{16} 5)$$

14. Let $a, b,$ and c be positive constant. Which one of the following is equivalent to $\log_5\left(\frac{a}{bc^3}\right)$?

(A) $\log_5 a - 3\log_5 b - 3\log_5 c$

(B) $\log_5 a - \log_5 b + 3\log_5 c$

(C) $\log_5 a - \log_5 b - 3\log_5 c$

(D) $\log_5 a - \log_5(b + 3c)$

(E) $\log_5 a - 3\log_5(b - c)$

(F) $\log_5 a - \log_5(b - 3c)$

15. Let x, y, and z be positive constants. Which one of the following is equivalent to $2\log(x) - \log y + 3\log z$?

(A) $\log\left(\frac{x^2z^3}{y}\right)$

(B) $\log\left(\frac{x^2}{yz^3}\right)$

(C) $\log(x^2yz^3)$

(D) $\log\left(\frac{6xz}{y}\right)$

(E) $\log\left(\frac{x^2+z^3}{y}\right)$

(F) $\log(x^2 - y + z^3)$

16. For any positive constant w, which one of the following is equivalent to $3 - 4\log_2 w$?

(A) $\log_2\left(\frac{9}{w^4}\right)$

(B) $\log_2\left(\frac{8}{w^4}\right)$

(C) $\log_2\left(\frac{3}{w^4}\right)$

(D) $\log_2\left(\frac{9}{4w}\right)$

(E) $\log_2\left(\frac{8}{4w}\right)$

(F) $\log_2\left(\frac{3}{4w}\right)$

17. The first two terms of an arithmetic sequence are $a_1 = \log(8)$ and $a_2 = \log(12)$. Find a_3.

18. The first two term of a geometric sequence are $g_1 = \log 3$ and $g_2 = \log 9$. Find g_3.

19. The function f is given by $f(x) = -2\log_5(x) + \log_5(8x^4) - \log_5(7x^3)$. Rewrite $f(x)$ as a single logarithm base 5 without negative exponents in any part of the expression. Your answer should be of the form $\log_5(\text{expression})$.

20. The function g is given by $g(x) = -2\log(10x) - \log(2x^7)$. Rewrite $g(x)$ as a single logarithm base 10 without negative exponents in any part of the expression. Your answer should be of the form $\log(\text{expression})$.

There will be two questions on your first logs quiz structured the same way as #19 and #20 on this homework. For extra practice on these topics, click/scan the QR code to the right. It is a worksheet of problems like #19 and #20. Your quiz questions will be copy and pasted from this website. Every time you open the site, a different set of 10 problems will appear, so you have infinite chances to practice.

Evaluating Logs and Log Properties HW Answers

1. 5
2. 3
3. 4
4. -3
5. $-\frac{1}{2}$
6. $\frac{1}{4}$
7. 0
8. 5
9. $\frac{5}{2}$
10. $-\frac{3}{2}$
11. 0
12. $-\frac{1}{2}$
13. $(\log_9 16)(\log_{25} 27)(\log_{16} 5) = \left(\frac{\ln 16}{\ln 9}\right)\left(\frac{\ln 27}{\ln 25}\right)\left(\frac{\ln 5}{\ln 16}\right) = \left(\frac{\ln 16}{\ln 16}\right)\left(\frac{\ln 27}{\ln 9}\right)\left(\frac{\ln 5}{\ln 25}\right) = \mathbf{\frac{3}{4}}$
14. C
15. A
16. B
17. The common difference is $d = a_2 - a_1 = \log(12) - \log(8) = \log\left(\frac{12}{8}\right) = \log\left(\frac{3}{2}\right)$.

    $$a_3 = a_2 + d = \log(12) + \log\left(\frac{3}{2}\right) = \mathbf{\log(18)}$$
18. The common ratio is $r = \frac{g_2}{g_1} = \frac{\log 9}{\log 3} = \frac{2\log 3}{\log 3} = 2$.

    $$g_3 = g_2 \times r = 2\log 9 = \mathbf{\log 81}$$
19. $f(x) = \log_5\left(\frac{8}{7x}\right)$
20. $g(x) = \log\left(\frac{1}{200x^9}\right)$