Unit 4: Logarithms

Write each expression in exponential form.

1. $\log_2 \frac{1}{32} = -5$

2. $\log x = 3$

Write each expression in logarithmic form.

3. $\sqrt{16} = 4$

$16^{1/2} = 4$

4. $e^7 = x$

$\log_e X = 7$

Evaluate. Use the change of base formula when necessary.

5. $\log_3 243$

$3^X = 243$

6. $\log_6 \frac{1}{6}$

$6^X = \frac{1}{6}$

7. $\log_{64} 4$

$64^X = 4$

8. $\log_7 200$

$\frac{\log 200}{\log 7}$

9. $\log_{12} 3$

$\frac{\log 3}{\log 12}$

10. $\ln 60$

Condense into a single logarithm. DO NOT EVALUATE.

11. $5 \cdot \log_5 4 - \log_5 16$

$\log_5 \frac{4^5}{16}$

12. $\frac{1}{3}(\ln 27 + 2 \cdot \ln 8)$

$\frac{1}{3}(\ln 27 + \ln 64)$

$= \ln 27^{1/3} + \ln 64^{1/3}$

$= \ln 3 \cdot 4$

13. $2 \cdot \log_3(4k) + 4 \cdot \log k$

$\log_3 (4k)^2 \cdot k^4$

14. $\frac{1}{2} \cdot \log_2(9x^{16}) - \frac{2}{3} \cdot \log_2(8x^3)$

$\log_2 3x^8 - \log_2 4x^2$

$= \log_2 \frac{3x^8}{4x^2}$

Expand each logarithm completely.

15. $\log_7 \left(\frac{1}{2}m^5\right)^4$

$\log_7 \frac{1}{16} m^{20}$

16. $\log_2 \left(\frac{5}{4}\right)^{x-3}$

1. $2^{-5} = \frac{1}{32}$
2. $10^3 = X$
3. $\log_{16} 4 = \frac{1}{2}$
4. $\ln X = 7$
5. $X = 5$
6. $X = -1$
7. $X = \frac{1}{3}$
8. 2.7228
9. 0.4421
10. 4.0943
11. $\log_5 64$
12. $\ln 12$
13. $\log_3 16k^6$
14. $\log_2 \frac{3x^6}{4}$
15. $\log_7 \frac{1}{16} + 20 \cdot \log_7 m$
16. $(x-3)(\log_2 5 - \log_2 4)$