

Rewrite each equation in its inverse form.

1) $\log_4 \frac{1}{16} = -2$

$$4^{-2} = \frac{1}{16}$$

2) $36^{\frac{1}{2}} = \frac{1}{6}$

$$\log_{36} \frac{1}{6} = -\frac{1}{2}$$

3) $\log 1000 = 3$

$$10^3 = 1000$$

4) $e^x = 8$

$$\ln 8 = x$$

5) $\log_9 27 = \frac{3}{2}$

$$9^{\frac{3}{2}} = 27$$

6) $\ln x = 5$

$$e^5 = x$$

Evaluate each expression. Show all work! If necessary, round answers to four decimal places.

7) $\log_7 82$

$$\frac{\log 82}{\log 7}$$

$$\boxed{2.2646}$$

8) $\log_{32} 2$

$$\frac{\log 2}{\log 32} = \boxed{.2}$$

9) $\log_{\frac{1}{2}} 16$

$$\frac{1}{2}^? = 16 \text{ or } \frac{\log 16}{\log(1/2)} = \boxed{-4}$$

10) $\ln 9$

$$\boxed{2.1972}$$

11) $\log 10000$

$$\boxed{4}$$

12) $\log_5 \frac{1}{125}$ $5^? = \frac{1}{125}$ or $\frac{\log \frac{1}{125}}{\log 5}$

$$\boxed{-3}$$

Expand or condense the following logarithms.

13) $\ln \frac{x^2}{y^2 z^3}$

$$\ln x^2 - \ln y^2 - \ln z^3$$

$$2 \ln x - 2 \ln y - 3 \ln z$$

14) $\log_6 3\sqrt{x}$

$$\log_6 3 + \log_6 x^{1/2}$$

$$\log_6 3 + \frac{1}{2} \log_6 x$$

15) $\log_3 x + \frac{1}{3} \log_3 y$

$$\log_3 x + y^{1/3}$$

$$\log_3 x + \sqrt[3]{y}$$

16) $\ln x - \ln y$

$$\ln \frac{x}{y}$$

17) $\ln \frac{4x^3}{y}$

$$\ln 4 + \ln x^3 - \ln y$$

$$\ln 4 + 3 \ln x - \ln y$$

18) $2 \ln 3 - 4 \ln y$

$$\ln \frac{3^2}{y^4}$$

$$\ln \frac{9}{y^4}$$

19) $2 \log_4 x + \log_4 y$

$$\log_4 x^2 + y$$

$$\log_4 x^2 y$$

20) $\frac{1}{2} [3 \ln x - \ln(x+1) - \ln(x-1)]$

$$\frac{1}{2} \left[\ln \frac{x^3}{(x+1)(x-1)} \right]$$

$$\ln \sqrt{\frac{x^3}{(x+1)(x-1)}}$$

21) $\log_4 5x^3y$

$$\log_4 5 + \log_4 x^3 + \log_4 y$$

$$\log_4 5 + 3\log_4 x + \log_4 y$$

22) $3\log_4 x + 2\log_4 3 + \frac{1}{2}\log_4 y$

$$\log_4 x^3 + \log_4 3^2 + \log_4 y^{\frac{1}{2}}$$

$$\log_4 x^3 \cdot 3^2 \cdot \sqrt{y}$$

$$\log_4 9x^3\sqrt{y}$$

23) $2\ln 8 - 5\ln 2$

$$\ln \frac{8^2}{2^5}$$

$$\ln \frac{64}{32}$$

$$\ln 2$$

24) $\log(2x - 3) + \log(3x - 4)$

$$\log(2x - 3)(3x - 4)$$

25.) $6\ln x - 5\ln y - 3\ln z$

$$\ln \frac{x^6}{y^5 z^3}$$

26.) $\log_2 \sqrt[3]{\frac{x}{y}}$

$$\log_2 \left(\frac{x}{y}\right)^{\frac{1}{3}}$$

$$\frac{1}{3} \left[\log_2 \frac{x}{y} \right]$$

$$\frac{1}{3} \left[\log_2 x - \log_2 y \right]$$