

Special Logs

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Common logarithm: base 10

$$\log = \text{base } 10$$
$$\log 100 = 10^2 = 2$$

$$\log_{10} x = \log x \quad (\text{tells you the exponent on the } 10 \text{ that gives you } x \text{ as an answer.})$$

$$10^? = x$$

Natural logarithm: base e

$$\log_e = \ln$$

$$\log_e x = \ln x \quad (\text{tells you the exponent on the } e \text{ that gives you } x \text{ as an answer.})$$

$$e^? = x$$

Use a calculator to evaluate the logarithm.

a. $\log 0.85$

$$10^? = 0.85$$

$$10^{-0.0706} = 0.85$$

b. $\ln 22$

$$e^? = 22$$

$$\ln 22 = 3.09$$

Inverses:

$$y = b^x \quad \text{and} \quad y = \log_b x \quad \text{are inverse functions}$$

$x = b^y$
 $\log_b x = y$

Two rules:

$$b^{\log_b x} = x$$

$$\log_b b^x = x$$

Simplify:

a. $10^{\log 4} = 4$

b. $10^{\log x} = x$

c. $\log_{10} 10^{-3x} = -3x$

d. $\log_2 16^x = \log_2 (2^4)^x = \log_2 (2)^{4x} = 4x$

e. $\log_3 27^x = \log_3 (3^3)^x = \log_3 (3)^{3x} = 3x$