

Rules for Powers and Logarithms

Powers:

$$x^a * x^b = x^{a+b}$$

$$\frac{x^a}{x^b} = x^{a-b}$$

$$(x^a)^b = x^{ab}$$

$$\frac{1}{x^a} = x^{-a}$$

$$\sqrt{x} = x^{1/2}$$

$$\sqrt[a]{x} = x^{1/a}$$

$$\sqrt[a]{x^b} = x^{b/a}$$

$$\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$$

Logarithms:

$$\log_e(x) = \ln(x)$$

$$\log_{10}(x) = \log(x)$$

$$\ln(ab) = \ln(a) + \ln(b)$$

$$\ln\left(\frac{a}{b}\right) = \ln(a) - \ln(b)$$

$$\ln(a^b) = b\ln(a)$$

$$\log_b(a) = \frac{\ln(a)}{\ln(b)}$$

Common Errors:

$$(x^a)^b \neq x^a x^b$$

$$\left(\frac{x}{y}\right)^a \neq \frac{x^a}{y}$$

$$\frac{x^a}{y} \neq x^a - y^{-1}$$

$$\ln(a + b) \neq \ln(a) + \ln(b)$$

$$\ln(a - b) \neq \ln(a) - \ln(b)$$

$$[\ln(a)]^b \neq b[\ln(a)]$$

$$\ln(ax^b) \neq b \ln(ax)$$