

Natural Logarithms

$$\log_3 9 = 2$$

↑
base

$$\log 100 = 2$$

↑
base 10

$$\ln 10 = \log_e 10$$

"e" is Euler's Number = 2.71828... (constant)

(constant)

$$\pi = 3.14...$$

$$y = e^x$$

Product

$$\ln XY = \ln X + \ln Y$$

Quotient

$$\ln\left(\frac{X}{Y}\right) = \ln X - \ln Y$$

Power

$$\ln X^Y = Y \ln X$$

$$3 \ln X + 2 \ln Y + \ln 5$$

$$\ln X^3 + \ln Y^2 + \ln 5$$

$$\ln(X^3 Y^2 5)$$

Solving Natural logs

$$\ln(x-3)^2 = 4 \quad \leftarrow \text{represents exponent}$$

↑
base is e

Convert to exponential

$$e^4 = (x-3)^2$$

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

$$\sqrt{e^4} = \sqrt{(x-3)^2}$$

$$\pm e^2 = x-3$$

$$\begin{array}{r} \pm 3 \quad \quad \quad \pm 3 \\ \hline \end{array}$$

$$\pm e^2 + 3 = x$$

$$\pm 7.4 + 3 = x$$

$$\begin{array}{r|l} 7.4 + 3 & -7.4 + 3 \\ \hline x = 10.4 & -4.4 \\ \hline \end{array}$$