EXPONENTS

A quick reference on Exponents

Exponents

$b^x > 0$ $\qquad$ $b^x = b^y$ if and only if $x = y$

$b^0 = 1$ $\qquad$ $b^1 = b$

$b^x b^y = b^{x+y}$ $\qquad$ $(b^x)^y = b^{xy}$

$b^x / b^y = b^{x-y}$

$a^x = e^{x \ln a}$

$b^{-x} = \dfrac{1}{b^x}$

$b^{1/2} = \sqrt{b}$ $\qquad$ $b^{1/x} = \sqrt[x]{b}$

$b^{x/y} = \left(\sqrt[y]{b}\right)^x = \sqrt[y]{b^x}$

Exponents and Logarithms

Natural Logarithmic Function $\qquad f(x) = \log_e x = \ln x$

The **natural number *e*** ≈ 2.71828182846. To get this number on a scientific calculator, press `1 INV lnx`. $\log_e x$ is written $\ln x$ (read "el - en - ex")

$e = \lim_{x \to 0} (1 + x)^{1/x}$ $\qquad$ $\ln x = b$ if and only if $e^b = x$

$\ln e^x = x$ $\qquad$ $e^{a \ln b} = b^a$

$\ln x^y = y \ln x$

$$e^{\pm x} = 1 \pm x + \frac{x^2}{2!} \pm \frac{x^3}{3!} + \frac{x^4}{4!} \pm \frac{x^5}{5!} + \cdots$$

Logarithms to other bases:

$y = \log_a x$ if and only if $a^y = x$

$\log_a xy = \log_a x + \log_a y$

$\log_a x^y = y \log_a x$

A scientific **calculator** can be used to evaluate an expression such as $\log_2 14$ by virtue of the fact that it is equivalent to $\ln 14 / \ln 2$.

The Quadratic Equation

Given the equation $ax^2 + bx + c = 0$: $\qquad$ $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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