Logarithm

Argument

$$b^x = a \iff \log_b a = x$$

base

(1) $\log_a a = 1, \ \log_a 1 = 0$

(2) $\log_a b \cdot \log_b a = 1 \Rightarrow \log_a b = \dfrac{1}{\log_b a}$

(3) $\log_c a = \log_b a \cdot \log_c b$ or $\log_c a = \dfrac{\log_b a}{\log_b c}$

(4) $\log_a(mn) = \log_a m + \log_a n$

(5) $\log_a\left(\dfrac{m}{n}\right) = \log_a m - \log_a n$

(6) $\log_a m^n = n\log_a m$

(7) $a^{\log_a m} = m$

(8) $\log_a\left(\dfrac{1}{n}\right) = -\log_a n$

(9) $\log_{a^\beta} n = \dfrac{1}{\beta}\log_a n$

(10) $\log_{a^\beta} n^\alpha = \dfrac{\alpha}{\beta}\log_a n \ , \ (\beta \neq 0)$

(11) $a^{\log_c b} = b^{\log_c a} \ , \ (a, b, c > 0 \text{ and } c \neq 1)$

If $a^y = x$ then $\log_a x = y$;

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

$\log_a \sqrt[x]{y} = \dfrac{1}{x}\log_a y$

$\log_a a^x = x$

$a^{\log_a x} = x$

$\log_a[m \times n] = \log_a m + \log_a n$

$\log_a[\dfrac{m}{n}] = \log_a m - \log_a n$

$\log_a m^n = n\log_a m$

$\log_a m = \dfrac{\log_b m}{\log_b a}$

$\log_a m = \log_a n$ then $m = n$

$m\log_b(x) + n\log_b(y) = \log_b(x^m y^n)$

$(a^x)^r = a^{rx}$

$a\log_a x = x$

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

$e^{\ln x} = x$

$a^0 = 1$

$a^{x+y} = a^x \cdot a^y$

$a^{x-y} = \dfrac{a^x}{a^y}$