1 Definition

$a^x = b \Leftrightarrow \log_a b = x$

2 Zero Rule

$\log(1) = 0$

$\ln(1) = 0$

3 log of the same number as base

$\log_a(a) = 1$

$\ln(e) = 1$

4 Product Rule

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

$\ln(xy) = \ln(x) + \ln(y)$

5 Quotient Rule

$\log_a\left(\frac{x}{y}\right) = \log_a(x) - \log_a(y)$

$\ln\left(\frac{x}{y}\right) = \ln(x) + \ln(y)$

6 Power Rule

$\log_a(x^y) = y\log_a(x)$

$\ln(x^y) = y\ln(x)$

7 Change of base Rule

$\log_a(x) = \frac{\log_b(x)}{\log_b(y)}$

$\log_a(x) \cdot \log_b(y) = \log_c(y)$

8 Equality Rule

$\log_a(x) = \log_a(y) \Rightarrow x = y$

$\ln(x) = \ln(y) \Rightarrow x = y$

9 Number Raised to Log

$b^{\log_b x} = x$

$e^{\ln x} = x$

10 Others

$-\log_a x = \log_a\left(\frac{1}{x}\right)$