

Properties of Logarithms

1. $\log_b(1) = 0$ because $b^0 = 1$
2. $\log_b(b) = 1$ because $b^1 = b$
3. *Inverse Properties* $\log_b(b^x) = x$ and $b^{\log_b(x)} = x$
4. $\log_b(xy) = \log_b(x) + \log_b(y)$
5. $\log_b\left(\frac{x}{y}\right) = \log_b(x) - \log_b(y)$
6. $\log_b(x^n) = n\log_b(x)$

Common Logarithm: $\log(x) = \log_{10}(x)$

Natural Logarithm: $\ln(x) = \log_e(x)$

Examples

1. $\ln\left(\frac{2a}{b}\right) = \ln(2) + \ln(a) - \ln(b)$
2. $\log_2\left(\frac{x^3}{yz}\right) = 3\log_2(x) - [\log_2(y) + \log_2(z)]$
 $= 3\log_2(x) - \log_2(y) - \log_2(z)$