

BLC 190

Logarithm Properties

Definition: $x = \log_b y$ is equivalent to $b^x = y$

Some Properties:

1. $\log_b(b^x) = x$

2. $b^{\log_b x} = x$

Logarithm Rules: Suppose that $x, y, b > 0$ Then, the following are true:

1. $\log_b(x) + \log_b(y) = \log_b(xy)$

2. $\log_b(y) - \log_b(x) = \log_b\left(\frac{y}{x}\right)$

3. $c \log_b(x) = \log_b(x^c)$

Change of Base Property: Suppose that $x, a, b > 0$. Then:

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

In particular, this means that:

$$\log_b(x) = \frac{\log_{10}(x)}{\log_{10}(b)}$$

And:

$$\log_b(x) = \frac{\ln x}{\ln b}$$