Properties of Exponents and Logs

Properties of Exponents

- $b^0 = 1$
- $b^1 = b$
- $b^m \cdot b^n = b^{m+n}$
- $(b^m)^n = b^{m \cdot n}$
- $(b \cdot c)^n = b^n \cdot c^n$
- $b^{m/n} = \sqrt[n]{b^m} = \left(\sqrt[n]{b}\right)^m$
- $\left(\frac{b}{c}\right)^n \frac{b^n}{c^n}$
- $b^{-n} = \frac{1}{b^n}$
- $\frac{1}{b^{-n}} = b^n$
- If $m = n$, then $b^m = b^n$
- If $b^m = b^n$, then $m = n$

Properties of Logs

- $\log_b 1 = 0$
- $\log_b b = 1$
- $b^{\log_b M} = M$
- $\log_b b^r = r$
- $\log_b(M \cdot N) = \log_b M + \log_b N$
- $\log_b \left(\frac{M}{N}\right) = \log_b M - \log_b N$
- $\log_b M^r = r \log_b M$
- If $M = N$, then $\log_b M = \log_b N$
- If $\log_b M = \log_b N$, then $M = N$
- $\log_b M = \frac{\log_c M}{\log_c b} = \frac{\log M}{\log b} = \frac{\ln M}{\ln b}$
  (Change of base formulas)