Exponent Rules

Assume that a and b are nonzero real numbers, and m and n are any integers.

1) Zero Property of Exponent

$$b^0 = 1$$

2) Negative Property of Exponent

$$b^{-n} = \frac{1}{b^n} \quad \text{OR} \quad \frac{1}{b^{-n}} = b^n$$

3) Product Property of Exponent

$$\left(b^m\right)\left(b^n\right) = b^{m+n} \qquad b^{1/2} = \sqrt{b}$$

4) Quotient Property of Exponent

$$\frac{b^m}{b^n} = b^{m-n}$$

5) Power of a Power Property of Exponent

$$\left(b^m\right)^n = b^{mn}$$

6) Power of a Product Property of Exponent

$$(ab)^m = a^m b^m$$

7) Power of a Quotient Property of Exponent

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

Log Rules

definition of log:
if $x = \log_b(n)$ then $n = b^x$

Rule 1: $\log_b(M \cdot N) = \log_b M + \log_b N$

Rule 2: $\log_b\left(\frac{M}{N}\right) = \log_b M - \log_b N$

Rule 3: $\log_b\left(M^k\right) = k \cdot \log_b M$

Rule 4: $\log_b(1) = 0$

Rule 5: $\log_b(b) = 1$

Rule 6: $\log_b\left(b^k\right) = k$

Rule 7: $b^{\log_b(k)} = k$

Where : $b > 1$, and M, N and k can be any real numbers

but M and N must be positive!

$$\log_b(x) = \frac{\log_d(x)}{\log_d(b)} \qquad d^{c\log_2(n)} = n^{c\log_2(d)}$$