8.2: Introduction to Exponents & logarithms

Rewriting:

exponential form

$b^{y} = x$

base, exponent, answer

logarithmic form

$\log_{b} x = y$

base, answer, exponent

Ex 1) rewrite $\log_6 36 = 2$ in exponential form.

$6^2 = 36$

Ex 2) rewrite $64 = 4^3$ in log form.

$\log_4 64 = 3$

Natural log: log of base e → LN

Ex 3) Rewrite $\ln_e 8 = 2.079$ in exponential form.

$e^{2.079} = 8$

Ex 4) rewrite $e^2 = 7.389$ in log form.

$\ln_e 7.389 = 2$

Evaluating

Ex 5) $\log_2 8 = \boxed{3}$

Ex 6) $\log_{10} 100 = \boxed{2}$

Ex 7) $\log_2 64 = \boxed{6}$

Ex 8) $\log_5 5 = \boxed{1}$

Ex 9) $\ln e = \boxed{1}$

Ex 10) $\log_{12} 1 = \boxed{0}$

Ex 11) $\log_7 (7^4) = 4 \cdot \log_7 7$ ($\log_7 7 = 1$)

$= 4 \cdot 1$

$= \boxed{4}$

Ex 12) $\log_2 10 = \frac{\log 10}{\log 2}$

$= \boxed{3.322}$

Ex 13) $\log_3 11 = \frac{\log 11}{\log 3}$

$= \boxed{2.183}$

Ex 14) $\ln 221 = \boxed{5.398}$

* common log = no base means base of 10

* property: $\log_b b = 1$

* property: $\log_b 1 = 0$

* property: $\log_b x^n = n \cdot \log_b x$

* change of base: $\log_b x = \frac{\log x}{\log b}$

More properties

→ multiplication: $\log_b M \cdot N = \log_b M + \log_b N$

→ division: $\log_b \frac{M}{N} = \log_b M - \log_b N$

→ same base: $\log_b M = \log_b N$, then $M = N$.