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Wednesday, October 18, 2017 11:21 AM

Section 4.2

Ex: log. form $\log_3 9 = y \leftrightarrow$ exp. form $3^y = 9$ $\boxed{y=2}$

$\log_3 9 = 2$

$\log_7 \frac{1}{49} = y \leftrightarrow$ $7^{(y)} = \frac{1}{49} = \frac{1}{7^2} = 7^{(-2)}$

$y = -2$

$\log_7 \frac{1}{49} = -2$

$\log_2 \sqrt[5]{2} = y \leftrightarrow$ $2^y = \sqrt[5]{2} = 2^{\frac{1}{5}}$

$\log_2 \sqrt[5]{2} = \frac{1}{5}$

Properties of logarithm

1) $\log_b b = 1$, where $b > 0$ and $b \neq 1$

2) $\log_b 1 = 0$, where $b > 0$ and $b \neq 1$.

3) $b^{\log_b x} = x$
$\log_b b^x = x$
} where $b > 0$ and $b \neq 1$.

Ex:

$\log_4 4^5 = 5$

$6^{\log_6 9} = 9$

Def: The natural logarithm is the log. function with base e, i.e.

$$\log_e x = \ln x$$

Def: The common logarithm is the log. function with base 10, i.e.

$$\log_{10} x = \log x$$

Ex: Evaluate:

$\ln e^5 =$

- $\log_2 32 = \log_2 2^5 = 5$

- $\log_{25} 5 = \log_{25} (25)^{\frac{1}{2}} = \frac{1}{2}$

Ex:

- $\ln e^{13x} = \log_e e^{13x} = 13x$

- $\log(100 \cdot 10^x) = (\log 100) \cdot \log 10^x$

$= \log(10^2 \cdot 10^x) = \log(10^{2+x}) = \boxed{2+x}$

$= \log 10^2 + \log 10^x$

Graphs