What you'll Learn About

$y = 3x+2$
$x = 3y+2$
$f^{-1}(x) = \frac{x-2}{3}$

Switch x and y

Changing between Logarithmic and exponential form:

If $x > 0$, $b > 0$ and $b \neq 1$, then $y = \log_b x$ if and only if $b^y = x$

Find the inverse function for $y = 2^x$

$x = 2^y$

Inverses of each other

$y = \log_2 x$

Read "log base 2 of x"

$x = b^y \iff y = \log_b x$

Properties:

If $x > 0$, $b > 0$ $b \neq 1$, and any real number y

- $\log_b 1 = 0$ because $b^0 = 1$
- $\log_b b = 1$ because $b^1 = b$
- $\log_b b^y = y$ because $b^y = b^y$
- $b^{\log_b x} = x$ because $\log_b x = \log_b y$

Evaluate the logarithmic expression without using a calculator

a) $\log_2 8 = 3$

$2^x = 8$

b) $\log_3 \sqrt{3} = \frac{1}{2}$

$3^x = \sqrt{3}$

$3^x = 3^{1/2}$

c) $\log_5 \frac{1}{25} = -2$

$5^x = \frac{1}{25}$

$5^x = \frac{1}{5^2}$

$= 5^{-2}$

d) $\log_4 1 = 0$

$4^x = 1$

$x = 0$

e) $\log_7 7 = 1$

$7^x = 7$

Common log
log Base 10
log

Natural Log
Base e
$\ln = \log_e$

$x = b^y \Leftrightarrow y = \log_b x$

Evaluate the logarithmic expression without using a calculator

a) $\log 100 = 2$

$10^x = 100$

b) $\log \sqrt[5]{10} = \frac{1}{5}$

$10^x = \sqrt[5]{10}$

$10^x = 10^{1/5}$

c) $\log \frac{1}{100} = -2$

$10^x = \frac{1}{100}$

d) $\ln \sqrt{e} = \frac{1}{2}$

$e^x = \sqrt{e}$

$e^x = e^{\frac{1}{2}}$

e) $\ln e^5 = 5$

$e^x = e^5$

f) $\ln \sqrt[5]{e} = \frac{1}{5}$

$e^x = \sqrt[5]{e}$

$e^x = e^{1/5}$

Evaluate the logarithmic expression without using a calculator

a) $6^{\log_6 11} = x$

$\log_6 11 = \log_6 x$

b) $10^{\log 6} =$

$10^{\log 6} = 6$

c) $e^{\ln 4} =$

$e^{\log_e 4} = 4$

Use a calculator to evaluate the logarithmic expression if it is defined and check your result by evaluating the corresponding exponential expression

a) $\log 34.5 = 1.538$

$10^{1.538} = 34.5$

b) $\log 0.43 = -.367$

$10^{x} = .43$

$= \frac{43}{100}$

$10^{-1} = \frac{1}{10} = .1$

$10^{-2} = \frac{1}{100} = .01$

$10^{-3} = \frac{1}{1000} = .001$

c) $\log(-3) =$ Undefined

$10^{x} = -3$

d) $\ln 23.5 = 3.157$

e) $\ln 0.48 = -.734$

f) $\ln(-5) =$ Undefined

Solve the equation

a) $\log x = 3$

$10^{3} = x$

$x = 1000$

b) $\log_2 x = 5$

$2^{5} = x$

$x = 32$