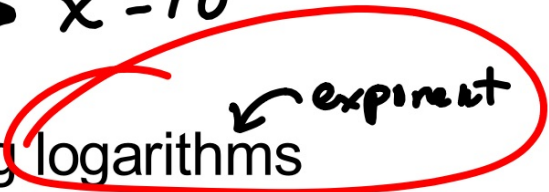


Precalc 11.4 $y = 10^x \leftrightarrow x = 10^y$



Evaluate expressions involving logarithms

Solve equations and inequalities involving logarithms

Graph logarithmic functions and inequalities

anti log
inverse function

exponent

logarithm

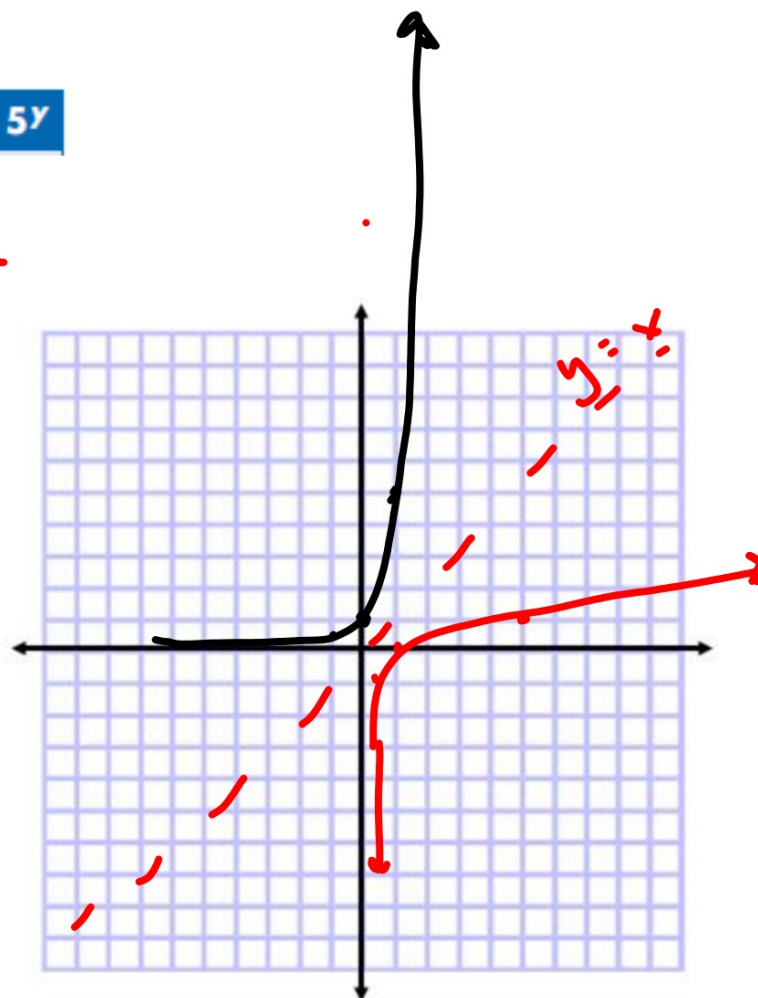
logarithmic function

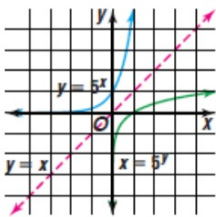
$$f(x): y = 5^x$$

0	1
1	5
2	25
-1	$\frac{1}{5}$

$$f^{-1}(x): x = 5^y$$

1	0
5	1
25	2
$\frac{1}{5}$	-1





x & y trade places
reflect over $y=x$

cut & paste

**Logarithmic
Function**

The logarithmic function $y = \log_a x$, where $a > 0$ and $a \neq 1$, is the inverse of the exponential function $y = a^x$. So, $y = \log_a x$ if and only if $x = a^y$.

Exponent form: Base^{power} = number

Example: $10^2 = 100$

anti log

$$\log_{10} 100 = 2$$

Log form: exponent = $\log_{(\text{base})}$ number

Example: $2 = \log_{10} 100$

number = antilog = AL

1 Write each equation in exponential form.

a. $\log_{125} 25 = \frac{2}{3}$

$$125^{\frac{2}{3}} = 25$$

b. $\log_8 2 = \frac{1}{3}$

$$8^{\frac{1}{3}} = 2$$

2 Write each equation in logarithmic form.

a. $4^3 = 64$

b. $3^{-3} = \frac{1}{27}$

$\log_{\textcircled{4}} 64 = 3$

$\log_3 \frac{1}{27} = -3$

3 Evaluate the expression $\log_7 \frac{1}{49} = x$

$$\log_7 \frac{1}{49} = x$$

$$7^x = \frac{1}{49} \quad 7^x = 7^{-2}$$
$$x = -2$$

5 Solve each equation.

a. $\log_p 64^{\frac{1}{3}} = \frac{1}{2}$

$$\begin{aligned} p^{\frac{1}{2}} &= 64^{\frac{1}{3}} \\ \left(p^{\frac{1}{2}}\right)^2 &= (4)^2 \\ p &= 16 \end{aligned}$$

Always check bases..

b. $\log_4(2x + 11) = \log_4(5x - 4)$

$$\begin{array}{r} 2x + 11 = 5x - 4 \\ -2x + 4 \quad -2x + 4 \\ \hline \end{array}$$

$$15 = 3x$$

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

If I add exponents, what is going on?

If I multiply exponents, what is going on?

$$2^3 \cdot 2^5 = 2^8$$

$$(2^3)^2 = 2^6$$

$$\text{c. } \log_{11} x + \log_{11} (x+1) = \log_{11} 6$$

$$x(x+1) = 6$$

$$\begin{array}{r} -6 \\ 3 \overline{) -2} \\ 1 \end{array}$$

$$x^2 + x - 6 = 0$$

$$(x+3)(x-2) = 0$$

$$\cancel{x = -3} \quad x = 2$$

21-51 odd