8-4 Logarithms

Feb 14

std. 11.0

The logarithm of y with base b is $\log_b y$ ("log base b of y") where $b > 0$, $b \neq 1$, and $y > 0$.

$\log_b y = x$ if and only if $b^x = y$

* A log is an exponent.

log form — exponential form

ex. 1 Write $\log_5 625 = 4$ in exponential form.

$5^4 = 625$

$\log_b y = x$ if and only if $b^x = y$

ex. 2 Evaluate:

a) $\log_2\left(\frac{1}{8}\right) = -3$

$\log_2(1/8) = x$

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

b) $\log_{81} 27 = 3/4$

$\log_{81} 27 = x$

$81^x = 27$

$(3^4)^x = 3^3$

$4x = 3$

$81^{3/4} = (\sqrt[4]{81})^3$

ex. 3 Evaluate a) $\log 48 \approx 1.6812$

4.8×10^1

$\log = \log_{10}$

b) $\log 4800 \approx 3.6812$

4.8×10^3

ex. 4 Evaluate $\ln 7 \approx 1.9459$

$\log_e 7 \approx 1.9459$

e^x

$\ln$

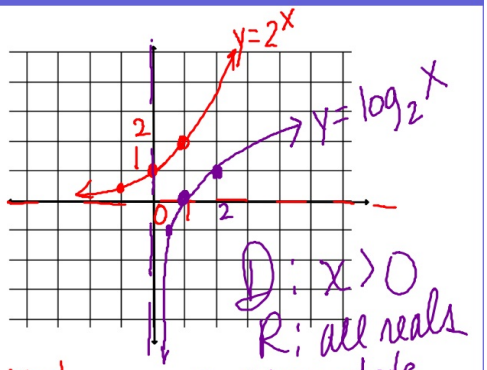
$\ln x$

ex. 5 graph $y = 2^x$ and $y = \log_2 x$

x	y
0	1
1	2
-1	$\frac{1}{2}$

$2^y = x$

x	y
1	0
2	1
$\frac{1}{2}$	-1



D: $x > 0$

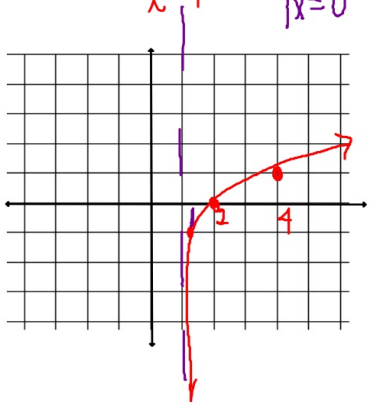
R: all reals

$x = 0$ asymptote

ex. 6 graph $y = \log_3 (x-1)$

$3^y = x - 1$

$3^y + 1 = x$



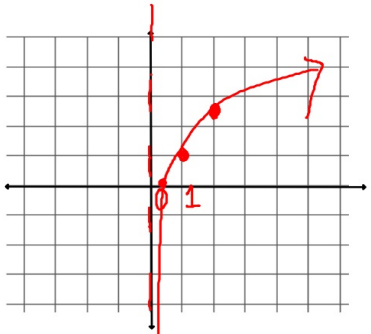
X	Y
2	0
4	1
$1\frac{1}{3}$	-1

ex. 7 graph $y = \ln x + 1$

$y = \log_e x + 1$

$y - 1 = \log_e x$

$e^{y-1} = x$



x	y
.4	0
1	1
2.7	2