Mar. 8, 2017

Sect. 5-3

Logarithmic Functions

Graphing

Logarithmic Functions

$f(x) \overset{or}{=} y = \log_b x$

"log, base b, of x" ← base

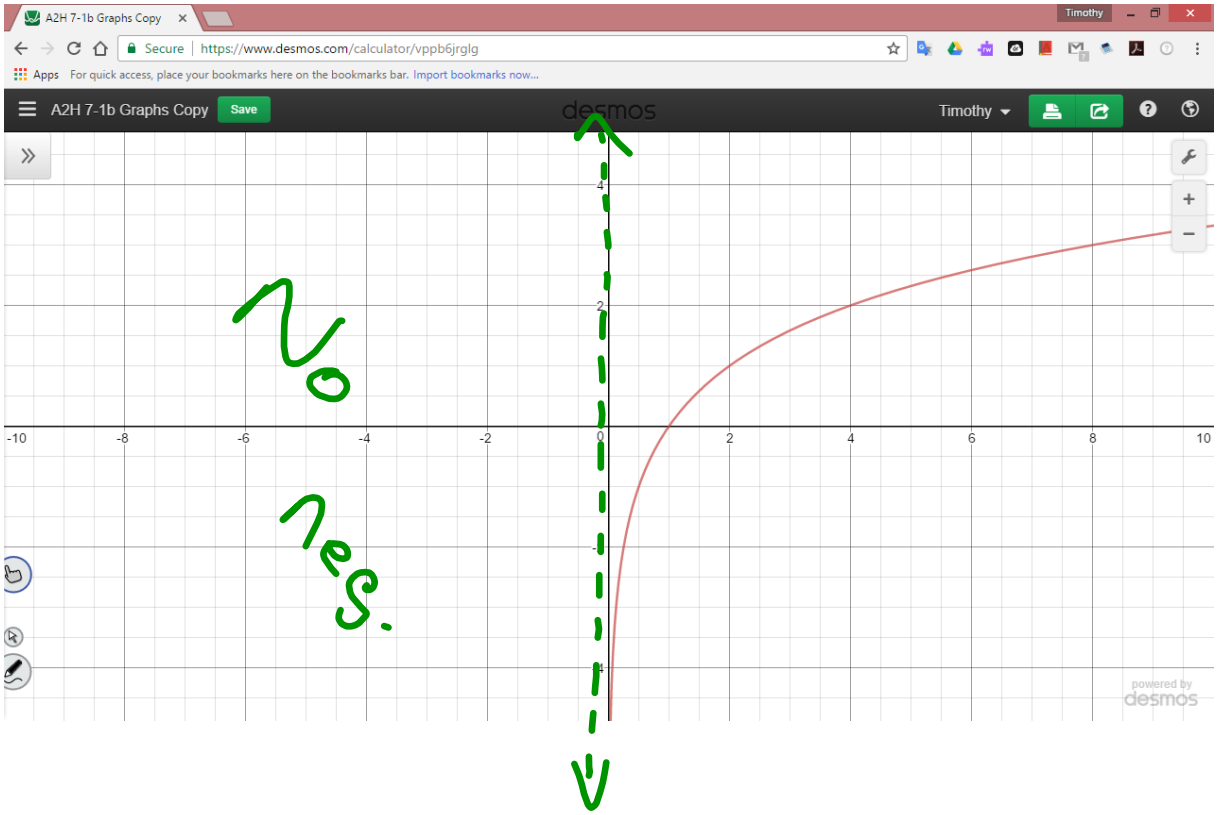
e.g. $y = \log_2 x$

Rule: $b \neq 1$

b is positive

$y = \log_2 x$

x	y
$\frac{1}{4}$	-2
$\frac{1}{2}$	-1
1	0
2	1
4	2



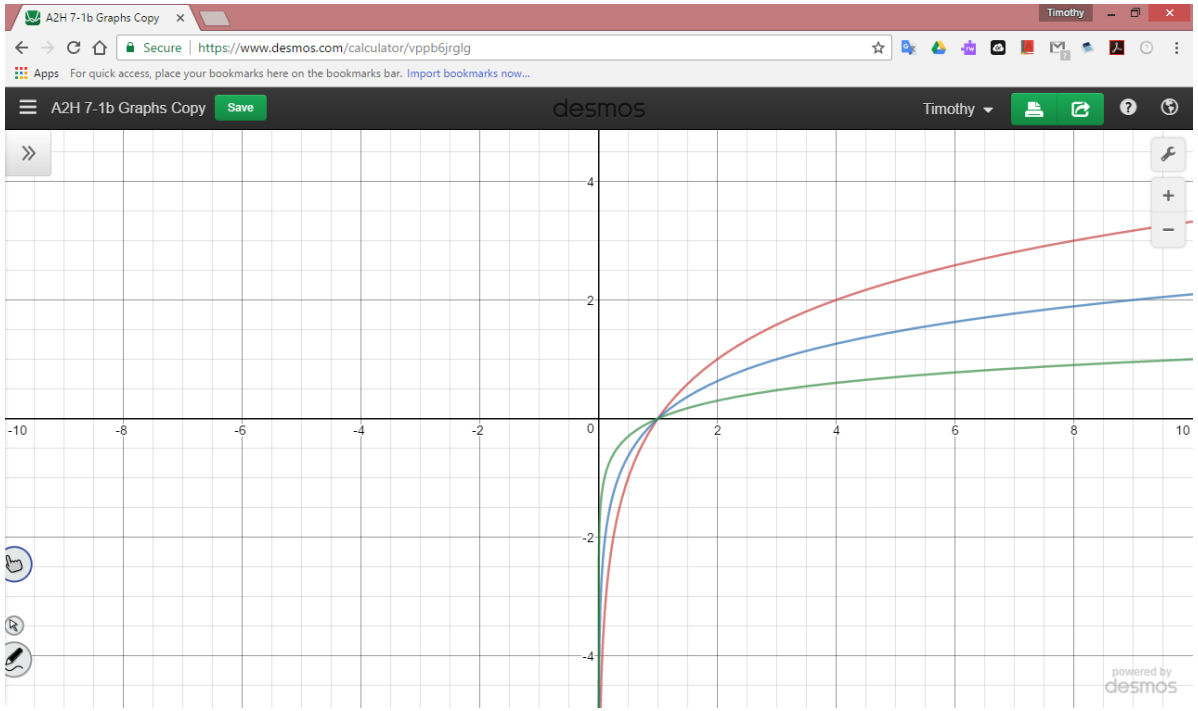
Change the base

$y = \log_2 x$

$y = \log_3 x$

$y = \log_{10} x$

Bigger base, slower growth



To play with the logarithmic graphs, click here

https://www.desmos.com/calculator/4uasx8obz5

Defn.

$\log_b c$

What is this asking?

$\log_b c = ?$

b raised to what power equals c

$b^? = c$

Evaluate

$\log_2 8 = 3$

$2^? = 8$

3

$\log_3 9 = 2$

$3^? = 9$

2

$\log_4 \frac{1}{16} = -2$

$4^? = \frac{1}{16}$

-2

$\log_{10} 1000 = 3$

$10^? = 1000$

3

Special Base

$\log_{10}$ called the "common log"

$\sqrt[2]{\ }$ Don't need to write the base

Evaluate:

$\log_{10} 1000 = 3$

$\log_e$ called the "natural log"

Remember: $e \approx 2.72$

Called the natural # or Euler's #
(pronounced "Oiler")

we change our notation $\ln$ ln

Evaluate $\ln 2 = 0.69$

Exponential $\Leftrightarrow$ Logarithmic Forms

$2^3 = 8 \iff \log_2 8 = 3$

$4^2 = 16 \implies \log_4 16 = 2$

$3^{-2} = \frac{1}{9} \impliedby \log_3 \frac{1}{9} = -2$