9.6 EXPONENTIAL AND LOG GRAPHS

ESSENTIAL QUESTION

How do I graph exponential and logarithmic equations using transformations?

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EXPONENTIAL PARENT FUNCTION

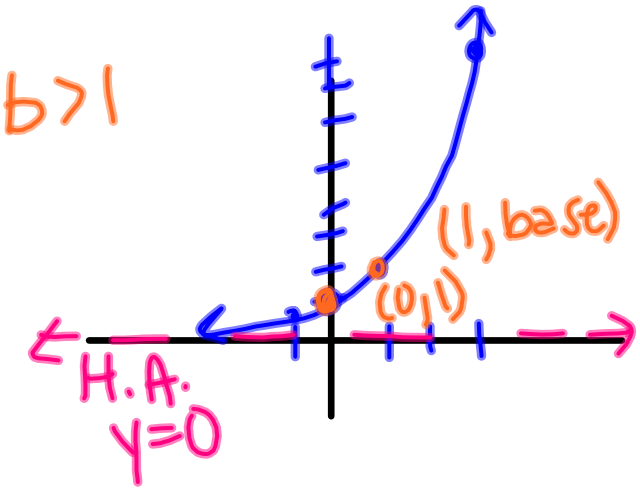
$y=b^x$

Always goes thru
(0, 1)
(1, base)

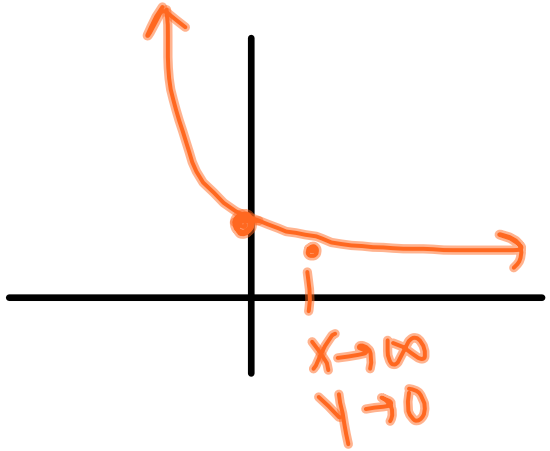
ex. $y=2^x$

x	y
0	1
1	2
3	8
-1	1/2

$b>1$



$0<b<1$ ex. $y=\left(\frac{1}{2}\right)^x$



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TRANSFORMATIONS

b^x+1	VS	↑1	y+1
b^{x+1}	HS	←1	x−1
b^{-x}	reflect y-axis	~	−x
b^x-1	VS	↓1	y−1
b^{x-1}	HS	→1	x+1
$-b^x$	reflect x-axis	~	−y

$y=5^x$ VS +4 HS x+2

ex. $y = 5^{x-2} + 4$

parent: (0,1) (1, 5) y=0

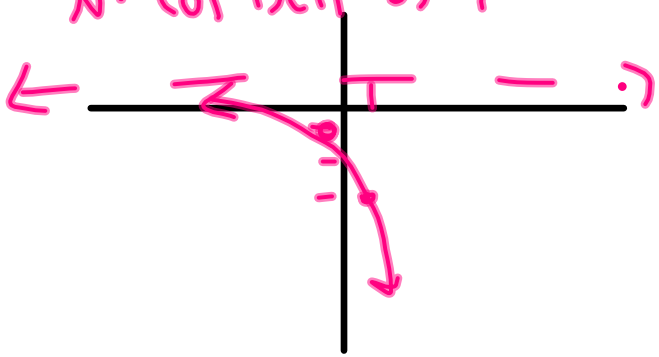
New: (2,5) (3, 9) y=4

reflect

ex. $y=-3^x$

P: (0,1) (1,3) y=0

N: (0,−1) (1,−3) y=0



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LOGARITHMIC PARENT FUNCTION

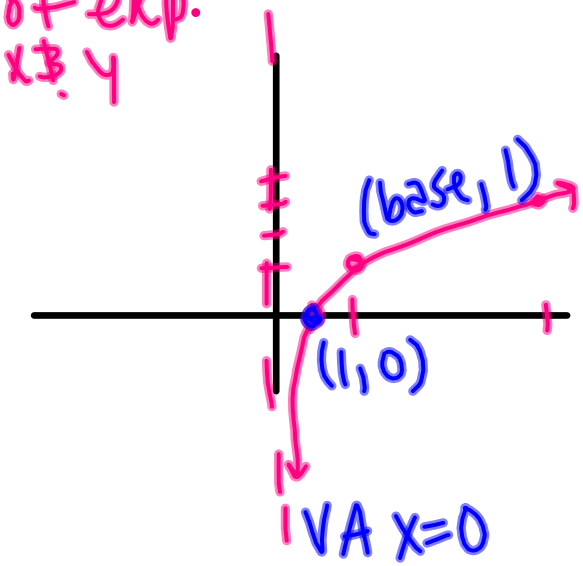
inverse of exp. switch x & y

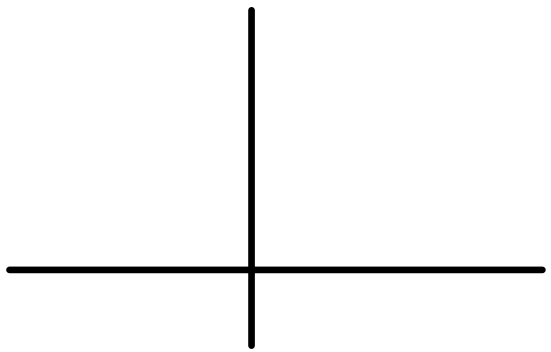
$y=\log_b x$

ex. $y=\log_2 x$

$2^y=x$

x	y
1	0
2	1
16	4





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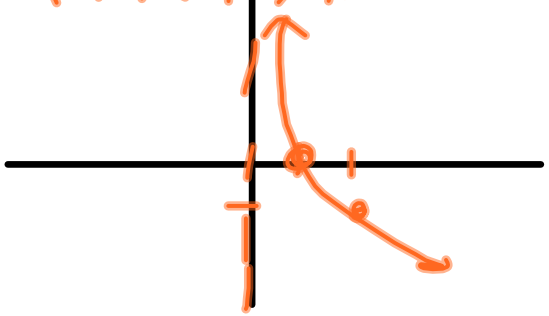
$\log_b(x+1)$	HS ← $x-1$
$\log_b(x)+1$	VS ↑ $y+1$
$\log_b(-x)$	inside $-x$
$-\log_b x$	outside $-y$

ex. $y = -\log_2 x$ $-y$

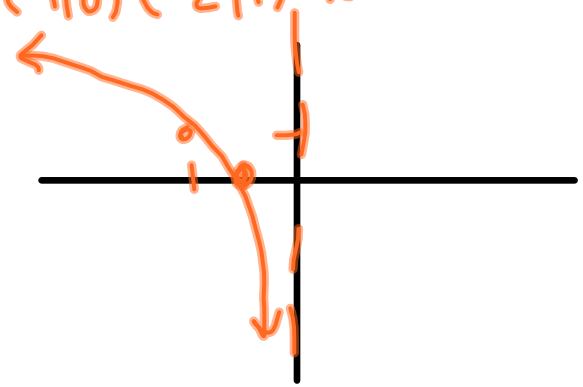
PF: (1,0) (2,1) $x=0$

NF: (1,0) (2,-1) $x=0$



ex. $y = \log_2(-x)$ $-x$

NF: (-1,0) (-2,1) $x=0$



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DOMAIN

based on argument, can't be negative

ex. Find the domain of $y = \log_3(-2x+6)+3$

$-2x+6>0$

$-2x>-6$

$\boxed{x<3}$

$\boxed{(-\infty, 3)}$