Week 9 Monday

March 4, 2019 7:40 AM

Quiz tomorrow 6.1

Test Thurs (8 Questions)

3.5, 3.6

4.1, 4.3, 4.4, 4.5

5.1 - 5.5

6.1, 6.2

- Do Sugg HW
- Practice Problems www.leahhoward.com

6.4 Logarithmic Functions Cont'd

RECAP

$\log_2 8 = 3$

"The exponent that goes on 2 to make 8 is 3"

$2^{\boxed{3}} = 8$

Notation

$\ln x$ means $\log_e x$

$\log x$ " $\log_{10} x$

Quick Ex:

$\ln e^{-7} = \log_e e^{-7} = -7$

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

DEF

$y = \log_a x$ is a logarithmic function

a is the base $(a > 0, a \neq 1)$

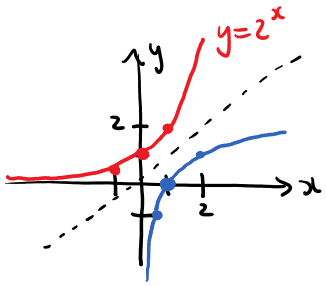
FACT

$y = a^x$ and $y = \log_a x$ are inverse functions

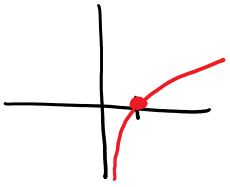
Ex: Graph $y = 2^x$ and $y = \log_2 x$

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

x	$y=\log_2 x$
$\frac{1}{2}$	$\log_2 \frac{1}{2}=-1$
1	$\log_2 1=0$
2	$\log_2 2=1$



Ex: $y=\log_a x$



$\log_a 1=0$

$(x,y)=(1,0)$

Know this graph ★

Ex: Consider $y=\log_a x$. Find:

a) domain (x-values)

$x>0$

b) range (y-values)

all real #

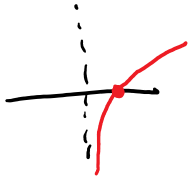
$-\infty<y<\infty$

c) intercepts

$(1,0)$

d) asymptotes

V.A. $x=0$



Ex: Find the inverse of $f(x)=\log_2(x-3)$

f : $y=\log_2(x-3)$

f^{-1} : Swap x and y

$x = \log_2 (y-3)$

Solve for y

"The exponent that goes on 2 to make $y-3$ is x"

$$2^x = y-3$$

$$2^x + 3 = y$$

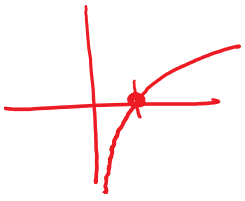
$$y = 2^x + 3$$

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

Ex: Find the domain

a) $f(x) = \log_3 (x+4)$

$y = \log_a x$



domain of $y = \log_a x$ is $x > 0$

$x + 4 > 0$

$x > -4$

b) $f(x) = \log_2 (x^2+1)$

$x^2+1 > 0$

all real # or $-\infty < x < \infty$

c) $f(x) = \ln|x|$

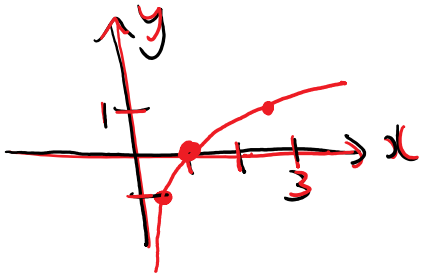
$|x| > 0$

$x \neq 0$ or $x < 0$ and $x > 0$

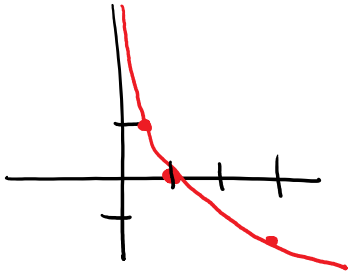
Ex: Graph $y = -\ln(x-3)$ using transformations

$y = \ln x$

x	$y = \log_e x$
$e^{-1} \approx 0.4$	$\log_e e^{-1} = -1$
1	$\log_e 1 = 0$
$e \approx 2.7$	$\log_e e = 1$



$y = -\ln x$ (Vertical Reflection)



$y = -\ln(x-3)$ (Right Shift)