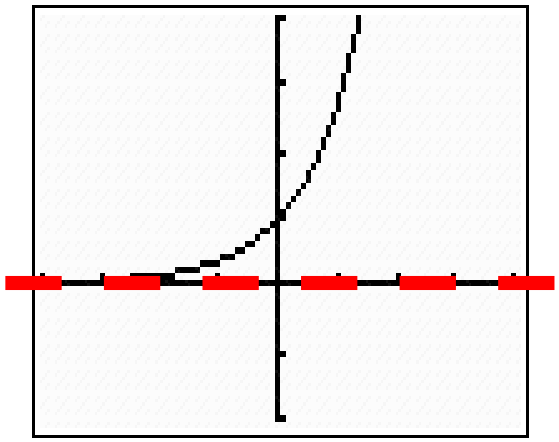
SM3 HANDOUT 5-4 (The Logarithm Function)

Exponential Function



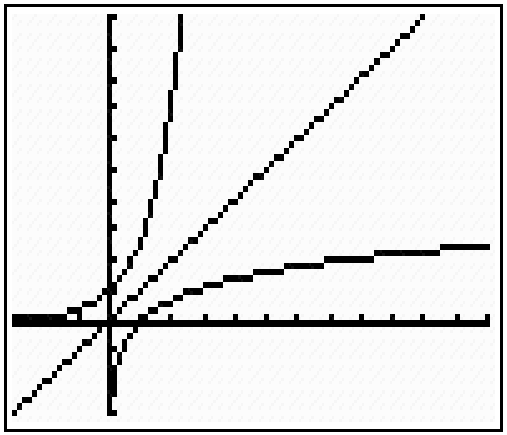
$f(x) = 10^x$

Domain = ?

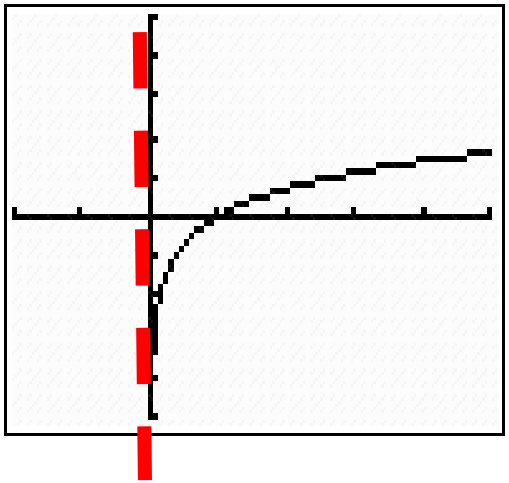
Range = ?

asymptote = ?

Inverse Functions



Logarithm Function



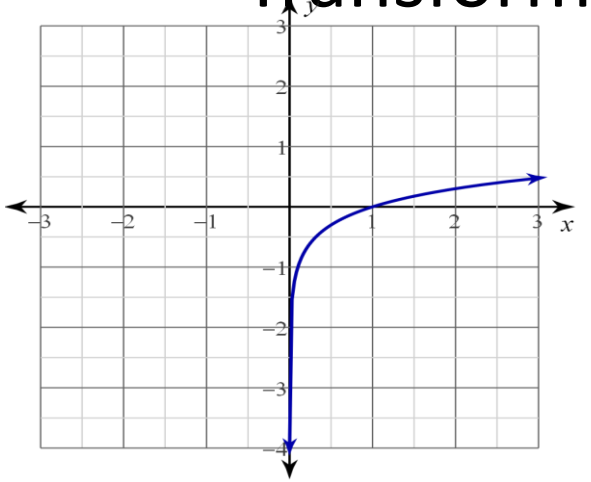
$f^{-1}(x) = log_{10}(x)$

Domain = ?

Range = ?

asymptote = ?

Transformations of the Log Function



$f(x) = \log x$

Domain = ? (0, ∞)

Range = ? (-∞, ∞)

vertical asymptote = ?

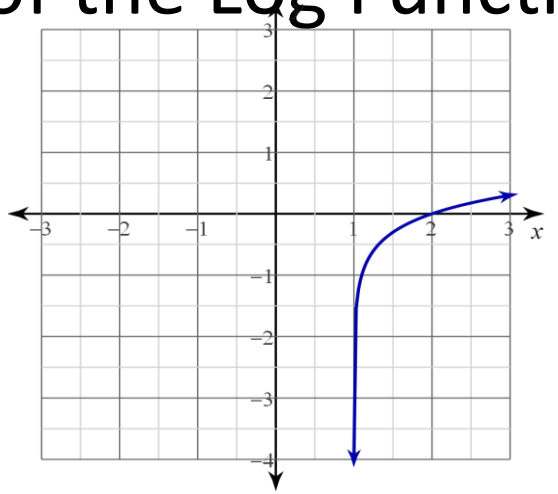
x = 0

X-intercept = ?

x = 1

Where increasing = ?

(0, ∞)



$g(x) = \log(x-1)$

Right 1 shift

Domain = ?

Range = ?

asymptote = ?

Evaluating Logs on your calculator

$\log 8 = ?$

Push buttons:

log | 8) | = |

$\log 0 = ?$ error Why?

$\ln 10 = ?$

Push buttons:

ln | 10) | = |

$\log(-3) = ?$ error Why?

Transformations of the Log Function

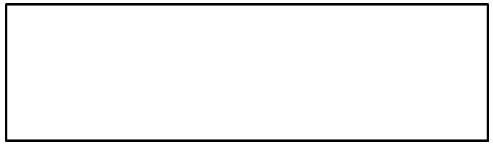
$$f(x) = \log x$$

$$g(x) = 2\log(x+1) - 3$$

Domain = ?

Range = ?

Asymptote = ?



$$f(x) = \log x$$

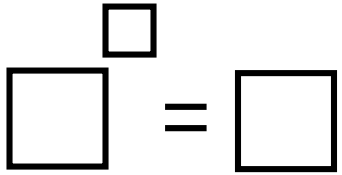
$$g(x) = -3\log(x-2)+1$$

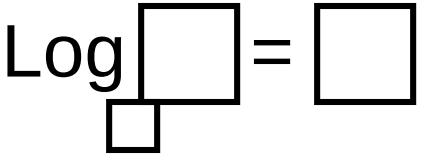
Domain = ?

Range = ?

Asymptote = ?

NOT exponential (has a vertical asymptote, does NOT have a horizontal asymptote.





Convert to logarithm form

What is the solution?

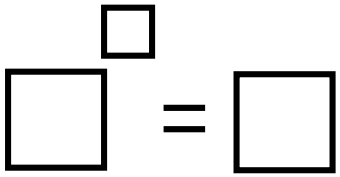
$5^x = 25$

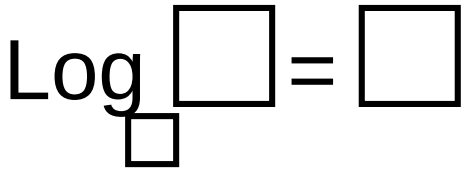
$4^x = 64$

$b^x = y$

$9^x = 81$

$10^x = 1000$





Convert to exponential form

What is the solution?

$\log_{10} 100 = x$

$\log_{3} 27 = x$

$\log_{9} 1 = x$

$\log_{4} x = 2$

$\log_{2} x = 5$

What is the base?

$\log_2 8 = x$

$\ln 5 = x$

$\log 20 = x$

What is the Solution?

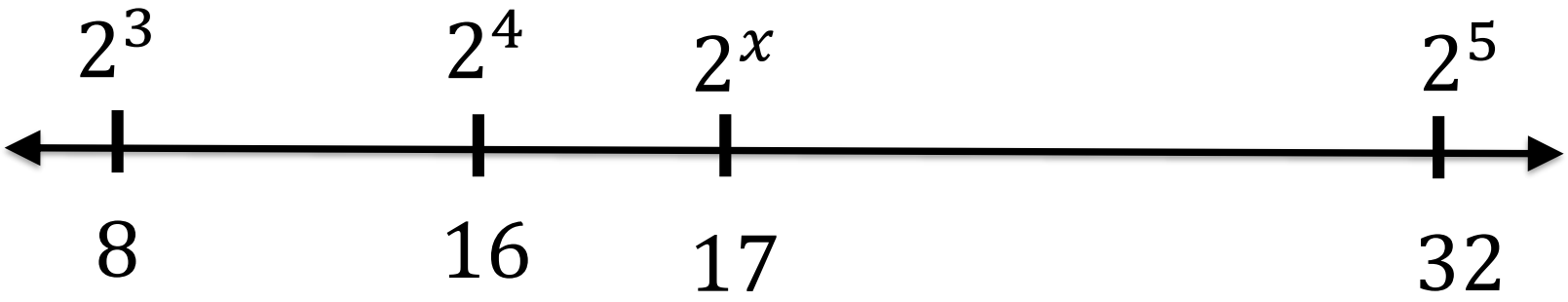
$\frac{1}{100} = log_{10}(x)$

$x = log_2\sqrt{2}$

$x = log_5 \frac{1}{\sqrt[3]{5}}$

Estimate the value of the log: $\log_2 17$

$\log_2 17 = x \quad \rightarrow 2^x = 17$



$x \approx 4.1$?

Find $\log_2 17$ on your calculator. $\log_2 17 = 4.09$

Estimate the value of the log (without using your calculator)

$log_3 30$ $log_5 30$ $log_6 30$

Find the Inverse $f^{-1}(x) = ?$

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

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

Finding the Inverse $f^{-1}(x) = ?$

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