

## Today's Plan:

**Learning Target (standard):** I will convert from exponential to logarithmic form and from logarithmic to exponential form.

**Students will:** Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

**Teacher will:** Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

**Assessment:** Board work, homework check and homework assignment

**Differentiation:** Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

p.539 #40-48 even

$$40) D: \mathbb{R}; R: \{y \mid y > 0\}; HA: y = 0$$

$$42) D: \mathbb{R}; R: \{y \mid y > 0\}; HA: y = 0$$

$$44) D: \mathbb{R}; R: \{y \mid y > 0\}; HA: y = 0$$

$$46) D: \mathbb{R}; R: \{y \mid y > -3\}; HA: y = -3$$

$$48) D: \mathbb{R}; R: \{y \mid y > 0\}; HA: y = 0$$

Graph. State the domain and range and asymptote.

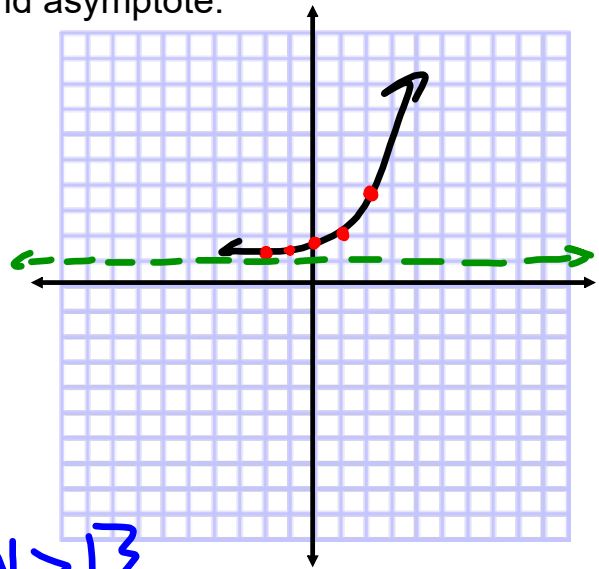
$$f(x) = e^{x-1} + 1$$

x	y
-2	1.050
-1	1.135
0	1.368
1	2
2	3.718

HA:  $y=1$

D:  $\mathbb{R}$

R:  $\{y \mid y > 1\}$



Graph. State the domain and range and asymptote.

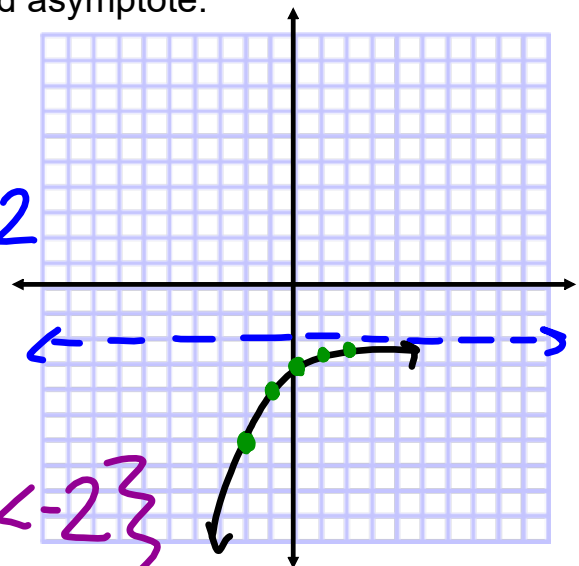
$$f(x) = -\left(\frac{1}{2}\right)^x - 2$$

x	y
-2	-6
-1	-4
0	-3
1	-2.5
2	-2.25

HA:  $y=-2$

D:  $\mathbb{R}$

R:  $\{y \mid y < -2\}$



### Logarithmic Functions:

A logarithmic function is a function where  $a > 0$  and  $a \neq 1$  and is denoted by

$$y = \log_a x$$

if and only if

$$x = a^y$$

$$f(x) = 3^x$$

$$f^{-1}(x) = \log_3 x$$

"y equals log base a of x"

### Special Logarithms:

- 1) natural logarithm

$$y = \log_e x$$

$$y = \ln x \quad \text{"natural log"}$$

- 2) common logarithm

$$y = \log_{10} x$$

$$y = \log x \quad \text{"common log"}$$

Change to exponential form:

$$\log_3 9 = 2$$

$$3^2 = 9$$

$$\log 10 = 1$$

$$\log_{10} 10 = 1$$

$$10^1 = 10$$

$$\begin{array}{l} y = \log_a x \\ a^y = x \end{array}$$

$$\ln 4 = x$$

$$\log_e 4 = x$$

$$e^x = 4$$

$$\log_6 7 = x$$

$$6^x = 7$$

$$\begin{array}{l} \log_a x = y \\ a^y = x \end{array}$$

Change to logarithmic form:

$$4^3 = 64$$

$$\log_4 64 = 3$$

$$1000^{\frac{1}{3}} = 10$$

$$\log_{1000} 10 = \frac{1}{3}$$

$$\begin{array}{l} a^y = x \\ \log_a x = y \end{array}$$

$$e^x = 5$$

$$\log_e 5 = x$$

$$\ln 5 = x$$

$$10^2 = 100$$

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

$$\log 100 = 2$$

Find the exact value without a calculator.

$$\log_2 1 = x$$

$$2^x = 1$$

$$x = 0$$

$$\log_2 1 = 0$$

$$\log_{\frac{1}{2}} 16 = x$$

$$\left(\frac{1}{2}\right)^x = 16$$

$$x = -4$$

### Assignment:

p.539 #50-92 even

For #50-60 even, write the exponential equation in logarithmic form.

For #62-76, write the logarithmic equation in exponential form.

For #78-92, find the value of the expression or equation. Show ALL work!