Today's Plan:

Learning Target (standard): I will review for the semester exam.

Students will: Complete practice problems over previous concepts at the boards and study for my exam.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuarcy and provide students feedback, describe and provide examples of exam problems.

Assessment: Board work

Differentiation: Students will work at the board, actively engage in practice review concepts with the aid of other students and the teacher.

Logarithmic Functions:

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

$$y = \log_a x \quad \text{if and only if} \quad x = a^y$$

$f(x) = 3^x$

$y = 3^x$

$x = 3^y$

$y = \log_3 x$

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

$y = e^x$

$x = e^y$

$y = \log_e x$

Special Logarithms:

1) natural logarithm

$y = \log_e x$

$y = \ln x$

2) common logarithm

$y = \log_{10} x$

$y = \log x$

Graph the function and its inverse function. Find the domain and range of each.
Find the inverse function.

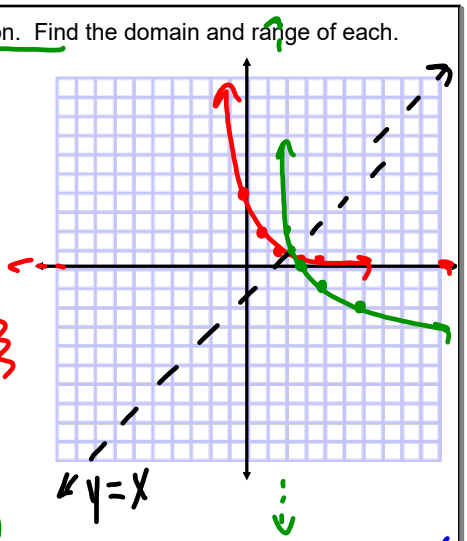
$$f(x) = \left(\frac{1}{2}\right)^x$$

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

HA: $y = 0$

D: $\mathbb{R}$

R: $\{y \mid y > 0\}$



$f^{-1}(x)$

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

VA: $x = 0$

D: $\{x \mid x > 0\}$

R: $\mathbb{R}$

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

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

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

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

Use synthetic division to tell whether the given value is a zero of the function. Write the quotient and remainder.

$f(x) = x^4 + 3x^3 - 21x^2 - 22x - 19; x = -6$ $(x+6)$

$$\begin{array}{r|rrrrr} -6 & 1 & 3 & -21 & -22 & -19 \\ & & -6 & 18 & 18 & 24 \\ \hline & 1 & -3 & -3 & -4 & 5 \end{array}$$

$x^3 - 3x^2 - 3x - 4 + \frac{5}{x+6}$

∴ By synthetic division, $x=-6$ is not a zero of $f(x)$ because there is a remainder of 5.

Factor and find all zeros.

$f(x) = 6x^5 + 3x^4 - 2x^3 - x^2 - 8x - 4$

$f(x) = 3x^4(2x+1) - x^2(2x+1) - 4(2x+1)$

$f(x) = (2x+1)(3x^4 - x^2 - 4)$ $x^2+1=0$, $x^2=-1$

$f(x) = (2x+1)(3x^2 - 4)(x^2 + 1)$

$f(x) = (2x+1)(\sqrt{3}x+2)(\sqrt{3}x-2)(x+i)(x-i)$

zeros: $x = -\frac{1}{2}, -\frac{2\sqrt{3}}{3}, \frac{2\sqrt{3}}{3}, -i, i$