Today's Plan:

Learning Target (standard): I will graph logarithmic functions using transformations. I will determine the intercepts of logarithmic functions.

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.

Graph 3 of the 5 using transformations. Find the domain and range and intercepts for each of the 5 functions.

1) $f(x) = -2\log_3(x-1)+1$

- D: $\{x \mid x > 1\}$
- R: $\mathfrak{R}$
- I_x: $(1+\sqrt{3}, 0)$
- I_y: —

2) $f(x) = \frac{1}{2}\log_4(2-x)-1$

- D: $\{x \mid x < 2\}$
- R: $\mathfrak{R}$
- I_x: $(-14, 0)$
- I_y: $\left(0, -\frac{3}{4}\right)$

3) $f(x) = -3\log_2\left(1-\frac{1}{2}x\right)+2$

- D: $\{x \mid x < -2\}$
- R: $\mathfrak{R}$
- I_x: $(2-2\sqrt[3]{4}, 0)$
- I_y: $(0, 2)$

$2^{\frac{2}{3}} = \sqrt[3]{2^2}$

← power

root

4) $f(x) = 1 - \log(2x+4)$

- D: $\{x \mid x > -2\}$
- R: $\mathfrak{R}$
- I_x: $(3, 0)$
- I_y: $(0, 1-\log 4)$

$y = 1 - \boxed{\log 4}$

$\log_{10} 4 = c$

$10^c = 4$

5) $f(x) = -2 + \frac{1}{2}\log_5(x+1)$

- D: $\{x \mid x > -1\}$
- R: $\mathfrak{R}$
- I_x: $(624, 0)$
- I_y: $(0, -2)$

I_x: (, 0)

$0 = -3\log_2\left(1-\frac{1}{2}x\right)+2$

$-2 = -3\log_2\left(1-\frac{1}{2}x\right)$

$\frac{2}{3} = \log_2\left(1-\frac{1}{2}x\right)$

$2^{\frac{2}{3}} = 1-\frac{1}{2}x$

$\sqrt[3]{4} = 1-\frac{1}{2}x$

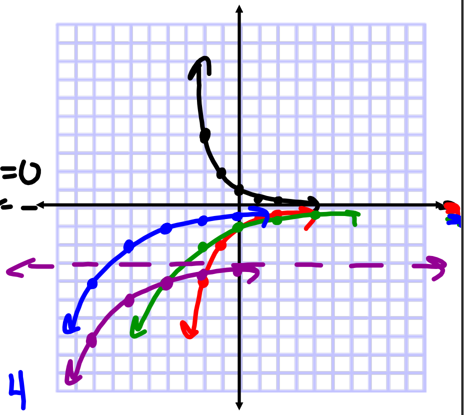
$\sqrt[3]{4} - 1 = -\frac{1}{2}x$

$-2\sqrt[3]{4} + 2 = x$

$x = 2 - 2\sqrt[3]{4}$

Graph. Find domain and range.

$$y = -\left(\frac{1}{2}\right)^{\frac{1}{2}x+2} - 3$$



parent: $y = \left(\frac{1}{2}\right)^x$ HA: $y=0$

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

2) $y = -\left(\frac{1}{2}\right)^{\frac{1}{2}x}$ h.s. by 2

3) $y = -\left(\frac{1}{2}\right)^{\frac{1}{2}(x+4)}$ shift left 4

4) $y = -\left(\frac{1}{2}\right)^{\frac{1}{2}x+2} - 3$ shift down 3

HA: $y=-3$

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

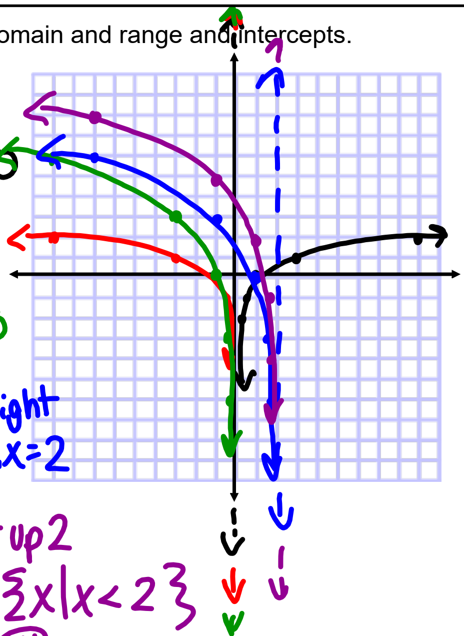
x	y
-2	4
-1	2
0	1
1	$\frac{1}{2}$
2	$\frac{1}{4}$

D: $\mathbb{R}$

R: $\{y \mid y < -3\}$

Graph using transformations. Find the domain and range and intercepts.

$$f(x) = 3\log_3(2-x) + 2$$



parent: $f(x) = \log_3 x$ VA: $x=0$

1) $f(x) = \log_3(-x)$ r_y

2) $f(x) = 3\log_3(-x)$ v.s. by 3

3) $f(x) = 3\log_3(-1(x-2))$ shift right 2 VA: $x=2$

4) $f(x) = 3\log_3(2-x)+2$ shift up 2

D: $\{x \mid x < 2\}$

R: $\mathbb{R}$

$y = \log_3 x$

$x = 3^y$

x	y
$\frac{1}{9}$	-2
$\frac{1}{3}$	-1
1	0
3	1
9	2

Graph using transformations. Find the domain and range and intercepts.

$f(x)=3\log_3(2-x)+2$

$I_x: \left(\frac{6-\sqrt[3]{3}}{3}, 0\right)$

$0=3\boxed{\log_3(2-x)}+2$

$-2=3\log_3(2-x)$

$-\frac{2}{3}=\log_3(2-x)$

$3^{-\frac{2}{3}}=2-x$

$\frac{1}{\sqrt[3]{3^2}}=2-x$

$\frac{1}{\sqrt[3]{9}}=2-x$

$\frac{1}{\sqrt[3]{9}}\cdot\frac{\sqrt[3]{3}}{\sqrt[3]{3}}=2-x$

$\frac{\sqrt[3]{3}}{3}=2-x$

$\frac{\sqrt[3]{3}}{3}-2=-x$

$x=2-\frac{\sqrt[3]{3}}{3}$

$x=\frac{6-\sqrt[3]{3}}{3}$

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

$x^{\frac{m}{n}}=\sqrt[n]{x^m}$

$I_y: (0, 3\log_3 2+2)$

$y=3\log_3(2-0)+2$

$y=3\boxed{\log_3 2}+2$

$\log_3 2=c$

$3^c=2$

$\log_5 25=c$

$5^c=25$

$c=2$

Find the x-intercept.

$$-3=4\boxed{\log_{\frac{1}{2}}(x-1)}$$

$I_x: (1+\sqrt[4]{8}, 0)$

$-\frac{3}{4}=\log_{\frac{1}{2}}(x-1)$

$\left(\frac{1}{2}\right)^{-\frac{3}{4}}=x-1$

$2^{\frac{3}{4}}=x-1$

$\sqrt[4]{2^3}=x-1$

$\sqrt[4]{8}=x-1$

$x=1+\sqrt[4]{8}$

Graph. Find the domain and range and intercepts.

$$f(x)=\begin{cases}\ln(-x), x<0\\ \ln x, x>0\end{cases}$$

$f(x)=\ln(-x)$

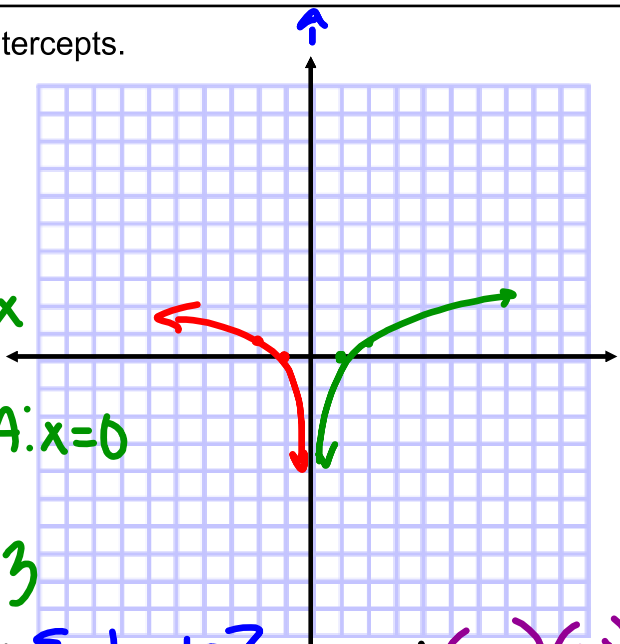
x	y
-2	.693
-1	0
0	–

VA: $x=0$

$f(x)=\ln x$

x	y
0	–
1	0
2	.693

VA: $x=0$



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

R: $\mathbb{R}$

Ix: $(-1,0),(1,0)$

Iy: —

Change to exponential form:

$\log_3 9=2$

$3^2=9$

$\ln 4=x$

$e^x=4$

$\log 10=1$

$10^1=10$

$\log_6 7=x$

$6^x=7$

Change to logarithmic form:

$4^3 = 64$

$\log_4 64 = 3$

$e^x = 5$

$\ln 5 = x$

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

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

$10^2 = 100$

$\log 100 = 2$

Find the exact value without a calculator.

$\log_2 1 = x$

$2^x = 1$

$x = 0$

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

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

$x = -4$

Find the exact value without a calculator.

$\log \sqrt{10} = x$ $\quad x = \frac{1}{2}$

$10^x = \sqrt{10}$

$\ln \sqrt[3]{e} = x$

$e^x = \sqrt[3]{e}$ $\quad x = \frac{1}{3}$

Assignment: p.317 #2-48 even

* write the problem & show work *