Today's Plan:

Learning Target (standard): I will find the inverse of a function and verify that it is indeed the inverse function. I will graph exponential functions using transformations.

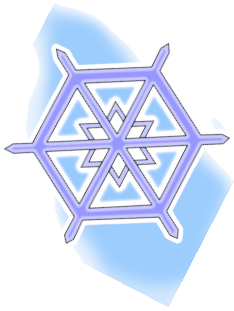
Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

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.

Please go over your graphs with someone near you! If you have questions, please do not hesitate to ask!



Find the inverse function. Verify your answer. Find the domain and range of each.

$f(x)=\frac{2x+3}{x+2}$ 1-1 ✓

$D_{f(x)}: \{x \mid x \neq -2\}$

$R_{f(x)}: \{y \mid y \neq 2\}$

$y=\frac{2x+3}{x+2}$

$x=\frac{2y+3}{y+2}$

$xy+2x=2y+3$

$xy-2y=-2x+3$

$y(x-2)=-2x+3$

$y=\frac{-2x+3}{x-2}$

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

$D_{f^{-1}(x)}: \{x \mid x \neq 2\}$

$R_{f^{-1}(x)}: \{y \mid y \neq -2\}$

$f(f^{-1}(x))=2\left(\frac{-2x+3}{x-2}\right)+3 \Big/ \frac{-2x+3}{x-2}+2 = \frac{-4x+6}{x-2}+\frac{3x-6}{x-2} \Big/ \frac{-2x+3}{x-2}+\frac{2x-4}{x-2}$

$=\frac{-x}{x-2} \Big/ \frac{-1}{x-2} = \frac{x}{x-2}\cdot\frac{x-2}{-1} = x$

$f(f^{-1}(x))=x$ ✓

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

$=-\frac{4x-6}{x+2}+\frac{3x+6}{x+2} \Big/ \frac{2x+3}{x+2}+\frac{-2x-4}{x+2} = \frac{-x}{x+2} \Big/ \frac{-1}{x+2}$

$=\frac{-x}{x+2}\cdot\frac{x+2}{-1} = x$

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

∴ Since $f(f^{-1}(x))=x$ and $f^{-1}(f(x))=x$, they are inverses of each other.

Graph. Find domain and range.

$y=3\cdot 2^{2x-4}-5$

parent: $y=2^x$ HA: $y=0$

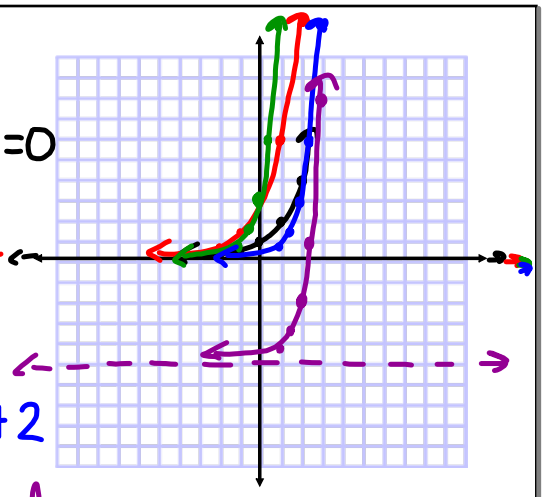
1) $y=3\cdot 2^x$ v.s.b 3

2) $y=3\cdot 2^{2x}$ h.c.b $\frac{1}{2}$

3) $y=3\cdot 2^{2(x-2)}$ shift right 2

4) $y=3\cdot 2^{2x-4}-5$ shift down 5

HA: $y=-5$ D: $\mathbb{R}$ R: $\{y \mid y>-5\}$



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

Graph. Find domain and range.

$$y = -\frac{1}{2} \cdot e^{3-\frac{1}{2}x} + 4$$

parent: $y = e^x$ HA: $y = 0$

1) $y = -e^x$ r_x

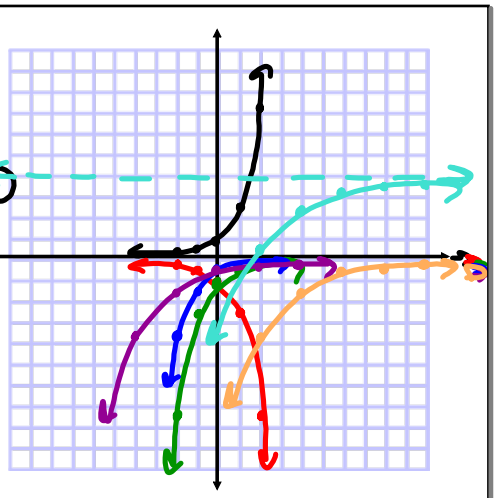
2) $y = -e^{-x}$ r_y

3) $y = -\frac{1}{2}e^{-x}$ v.c. by $\frac{1}{2}$

4) $y = -\frac{1}{2}e^{-\frac{1}{2}x}$ h.s. by 2

5) $y = -\frac{1}{2}e^{-\frac{1}{2}(x-6)}$ shift right 6

6) $y = -\frac{1}{2}e^{3-\frac{1}{2}x} + 4$ shift up 4



x	y
-2	.135
-1	.368
0	1
1	2.718
2	7.389

D: $\mathbb{R}$

HA: $y = 4$

R: $\{y \mid y < 4\}$

Graph. Find domain and range.

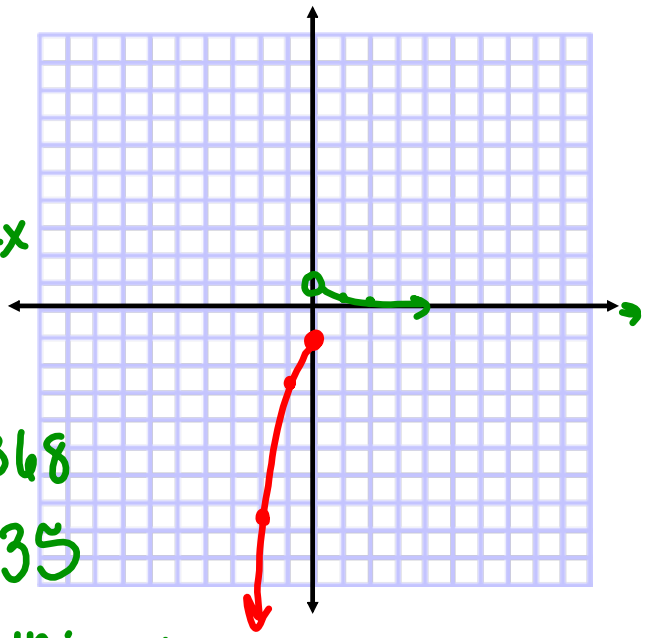
$$f(x) = \begin{cases} -e^{-x}, & x \le 0 \\ e^{-x}, & x > 0 \end{cases}$$

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

x	y
-2	-7.389
-1	-2.718
0	-1

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

x	y
0	1
1	.368
2	.135



D: $\mathbb{R}$

R: $\{y \mid y \le -1, 0 < y < 1\}$

HA: $y = 0$

Graph. Find domain and range.

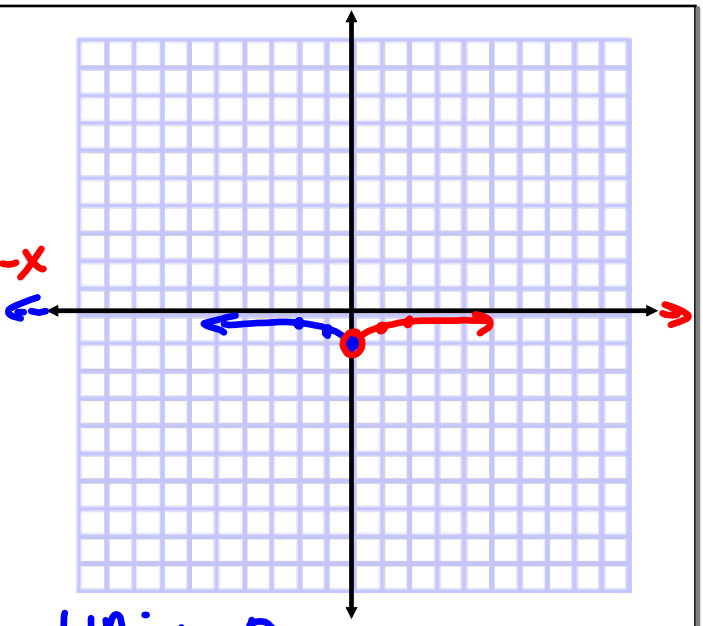
$$f(x)=\begin{cases}-2^{x}, & x\le 0\\ -2^{-x}, & x>0\end{cases}$$

$f(x)=-2^{x}$

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

$f(x)=-2^{-x}$

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



HA: $y=0$

D: $\mathbb{R}$

R: $\{y \mid -1\le y<0\}$

Graph and find domain and range:

1) $f(x)=-\frac{1}{2}\cdot 3^{2-x}$

2) $y=-4e^{-\frac{1}{2}x+1}-3$

3) $f(x)=\frac{1}{2}\cdot 2^{4x+2}+1$

4) $f(x)=\begin{cases}-2e^{x}, & x<0\\ e^{2x}x>0\end{cases}$

5) $f(x)=\begin{cases}2e^{x}, & x<0\\ e^{-x}, & x\ge 0\end{cases}$

6) $f(x)=\begin{cases}3^{-x}, & x\ge 0\\ -3^{-x}, & x<0\end{cases}$

Find the inverse. Verify your answer. Find the domain and range of each.

7) $f(x)=\frac{3x+2}{4x+7}$