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.

p.295 #18-50 (by 4)

18) graph

22) verify with composites - both result in x

26) verify with composites - both result in x

30) verify with composites - both result in x

* verify #34-50 & find D and R *

34) $f(x) = 1 - 3x$ D: $\mathbb{R}$ R: $\mathbb{R}$

$f^{-1}(x) = -\frac{1}{3}x + \frac{1}{3}$ D: $\mathbb{R}$ R: $\mathbb{R}$

38) $f(x) = x^2 + 9, x \geq 0$ D: $\{x \mid x \geq 0\}$ R: $\{y \mid y \geq 9\}$

$f^{-1}(x) = \sqrt{x-9}$

D: $\{x \mid x \geq 9\}$

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

42) $f(x) = \frac{4}{x+2}$ D: $\{x \mid x \neq -2\}$ R: $\{y \mid y \neq 0\}$

$f^{-1}(x) = \frac{-2x+4}{x}$ D: $\{x \mid x \neq 0\}$ R: $\{y \mid y \neq -2\}$

46) $f(x) = (x-1)^2, x \geq 1$ D: $\{x \mid x \geq 1\}$ R: $\{y \mid y \geq 0\}$

$f^{-1}(x) = \sqrt{x} + 1$ D: $\{x \mid x \geq 0\}$ R: $\{y \mid y \geq 1\}$

50) $f(x) = \frac{2x-3}{x+4}$ D: $\{x \mid x \neq -4\}$ R: $\{y \mid y \neq 2\}$

$f^{-1}(x) = \frac{-4x-3}{x-2}$ D: $\{x \mid x \neq 2\}$ R: $\{y \mid y \neq -4\}$

Transformations: $f(x) = a^{(x)}$ — "inside"; "outside"

1) reflection over *x*-axis

$f(x) = -a^x$

2) reflection over *y*-axis

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

3) vertical stretch/compression

$f(x) = c \cdot a^x = c(a^x)$ $c > 1$ v.s. by c; $0 < c < 1$ v.c. by c

4) horizontal stretch/compression

$f(x) = a^{cx}$ $c > 1$ h.c. by $\frac{1}{c}$; $0 < c < 1$ h.s. by $\frac{1}{c}$

5) shift left/right

left: $f(x) = a^{x+c}$ right: $f(x) = a^{x-c}$ *factor

*6) shift up/down

up: $f(x) = a^x + c$ down: $f(x) = a^x - c$

*affect the HA

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

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

1-1 ✓

$D_{f(x)}$: $\{x|x\neq 3\}$

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

$y=\frac{2x+1}{x-3}$

$x=\frac{2y+1}{y-3}$

$xy-3x=2y+1$

$xy-2y=3x+1$

$y(x-2)=3x+1$

$y=\frac{3x+1}{x-2}$

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

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

$R_{f^{-1}(x)}$: $\{y|y\neq 3\}$

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

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

$=\frac{\frac{6x+2}{x-2}+\frac{x-2}{x-2}}{\frac{3x+1}{x-2}+\frac{-3x+6}{x-2}}=\frac{\frac{7x}{x-2}}{\frac{7}{x-2}}$

$=\frac{7x}{x-2}\cdot\frac{x-2}{7}=x$

$f(f^{-1}(x))=x$ ✓

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

$=\frac{\frac{6x+3}{x-3}+\frac{x-3}{x-3}}{\frac{2x+1}{x-3}+\frac{-2x+6}{x-3}}=\frac{\frac{7x}{x-3}}{\frac{7}{x-3}}$

$=\frac{7x}{x-3}\cdot\frac{x-3}{7}=x$

$f^{-1}(f(x))=x$ ✓

Write using transformations.

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

parent: $f(x)=3^x$ HA: $y=0$

1) $f(x)=-3^x$ r_x

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

3) $f(x)=-2(3^{-x})$ v.s.b 2

4) $f(x)=-2(3^{-2x})$ h.c. by $\frac{1}{2}$

5) $f(x)=-2(3^{-2(x-\frac{1}{2})})$ shift right $\frac{1}{2}$

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

HA: $y=3$

Write using transformations.

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

parent: $f(x)=\left(\frac{2}{3}\right)^x$ HA: $y=0$

1) $f(x)=\frac{1}{4}\left(\frac{2}{3}\right)^x$ v.c. by $\frac{1}{4}$

2) $f(x)=\frac{1}{4}\left(\frac{2}{3}\right)^{\frac{1}{2}x}$ h.s. by 2

3) $f(x)=\frac{1}{4}\left(\frac{2}{3}\right)^{\frac{1}{2}(x+8)}$ shift left 8

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

HA: $y=-4$

Write using transformations.

$$f(x)=\frac{2}{5}e^{6-3x}+4$$

parent: $f(x)=e^x$ HA: $y=0$

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

2) $f(x)=\frac{2}{5}e^{-x}$ v.c. by $\frac{2}{5}$

3) $f(x)=\frac{2}{5}e^{-3x}$ h.c. by $\frac{1}{3}$

4) $f(x)=\frac{2}{5}e^{-3(x-2)}$ shift right 2

5) $f(x)=\frac{2}{5}e^{6-3x}+4$ shift up 4

HA: $y=4$

Graph using transformations. Find domain and range.

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

parent: $f(x) = e^x$ HA: $y = 0$

1) $f(x) = -e^x$ r_x

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

3) $f(x) = -2e^{-x}$ v.s. by 2

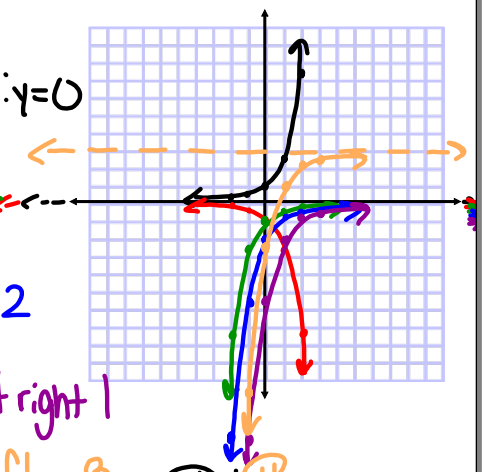
4) $f(x) = -2e^{-1(x-1)}$ shift right 1

5) $f(x) = -2e^{1-x} + 3$ shift up 3

HA: $y = 3$

D: $\mathbb{R}$

R: $\{y | y < 3\}$



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

Graph and find domain and range:

1) $f(x) = -2e^{4x+4}$

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

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

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

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