

More Practice with Transformations

1) Which transformation best describes the graphical relationship between  $f(x) = 2^x$  and  $g(x) = (1/2)^x$ ?

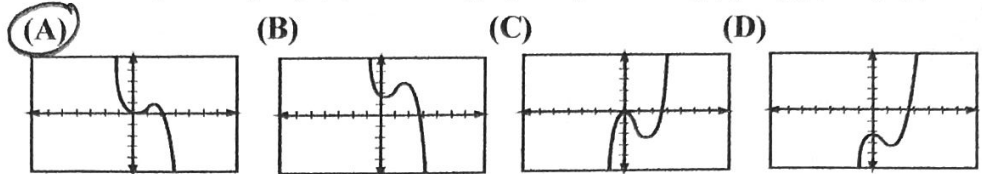
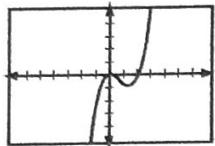
- (A) reflection in the line  $y = x$
- (B) reflection in the origin
- (C) reflection in the  $x$ -axis
- (D) reflection in the  $y$ -axis**
- (E) None of these

$g(x) = (2^{-1})^x$   
 $g(x) = 2^{-x}$

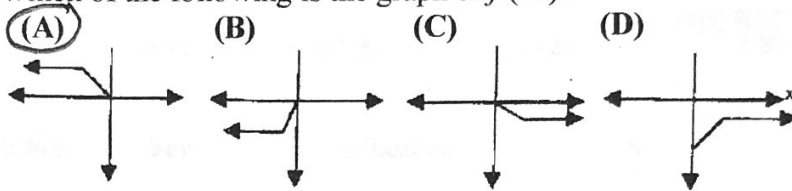
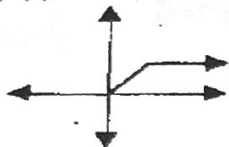
2) If  $a > 0$ , which function represents the reflection of  $y = a^x$  in the  $x$ -axis?

- (A)  $y = -a^x$**
- (B)  $y = (1/a)^{-x}$
- (C)  $x = a^y$
- (D)  $y = (1/a)^x$
- (E) None of these

3) The accompanying graph represents the equation  $y = f(x)$ . Which graph represents  $g(x)$  if  $g(x) = -f(x)$ ?



4) The graph below represents  $f(x)$ . Which of the following is the graph of  $f(-x)$ ?



Write an equation for the indicated basic function with the transformations stated. Write the transformations BOTH with the function notation AND the actual function. For example "The absolute value function horizontally stretched by a factor of 3 and translated up 5 units" your answer should look like this:

$f(x) = |x| \rightarrow f\left(\frac{x}{3}\right) + 5 = \left|\frac{x}{3}\right| + 5$

5) The greatest integer function vertically compressed (aka "shrunk") by a factor of  $2/3$ , reflected over the  $y$ -axis, then translated left 27 units and down 19 units.

$f(x) = \frac{2}{3} \lfloor -(x+27) \rfloor - 19$   
 or  $f(x) = \frac{2}{3} \text{int}(-x-27) - 19$

6) The cosine function horizontally compressed (aka "shrunk") by a factor of  $1/4$ , reflected over the  $x$ -axis, then translated right 24 units.

$-f(4(x-24)) = -\cos(4(x-24))$

7) The logistic function is vertically stretched by a factor of 5, reflected over the  $y$ -axis, then translated left 11 and down 21.

$f(x) = \frac{5}{1+e^{-(x+11)}} - 21$

8) The exponential function is reflected over the  $y$ -axis, horizontally stretched by a factor of 7, then translated right 15 units.

$f\left(-\frac{1}{7}(x-15)\right) = e^{-\frac{1}{7}(x-15)}$

Each function below is a transformation of one of the 12 basic functions. Describe the transformations.

9)  $f(x) = e^{-2(x-4)} - 7$

- $f(x) = e^{-2(x-4)} - 7$
- reflect over  $y$ -axis
  - horiz. compression by  $\frac{1}{2}$
  - translate down 7 & right 4

10)  $g(x) = \frac{1}{2+2e^{-x+5}} = \frac{1}{2} \left( \frac{1}{1+e^{-(x-5)}} \right)$

- vertically compressed by a factor of  $\frac{1}{2}$
- translate right 5

11)  $f(x) = 9\cos(2x) - 11$

- vertical stretch by 9
- horizontal compression by a factor of  $\frac{1}{2}$
- translate down 11