

# Pre-Calculus Objective 1.01 Transformations

1. Let  $f(x) = x^2 - 4x$ . Determine the function for  $g(x)$ . Describe the transformation in words from  
2.  $f(x)$  to  $g(x)$ .

a.  $g(x) = 2f(x)$

b.  $g(x) = f(2x)$

c.  $g(x) = -f(x)$

d.  $g(x) = f(-x)$

e.  $g(x) = f(x + 2)$

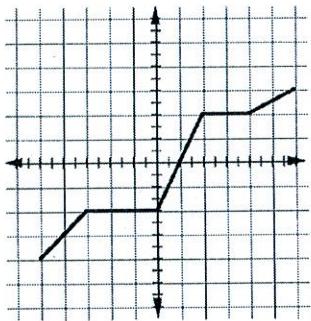
f.  $g(x) = f(x) - 4$

g.  $g(x) = |f(x)|$

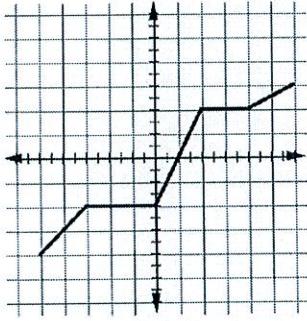
h.  $g(x) = f(|x|)$

2. If the graph of  $f(x)$  is given, sketch the graph of  $g(x)$ .

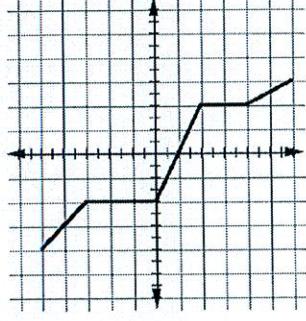
a.  $g(x) = 2f(x)$



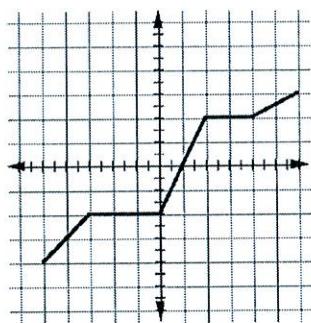
b.  $g(x) = f(2x)$



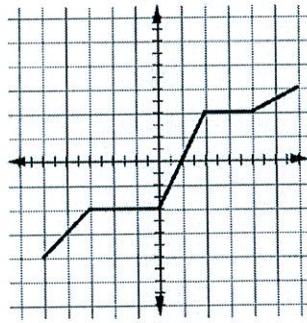
c.  $g(x) = -f(x)$



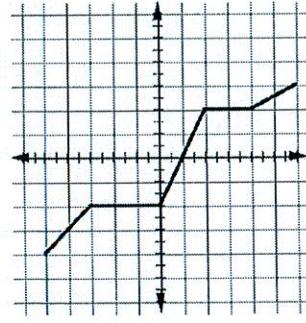
d.  $g(x) = f(-x)$



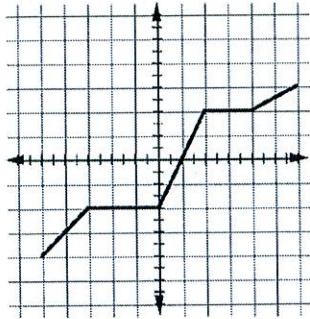
e.  $g(x) = f(x + 2)$



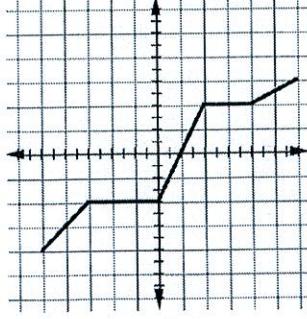
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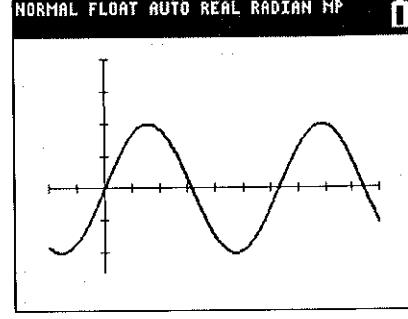
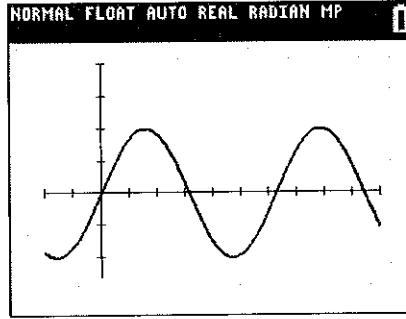
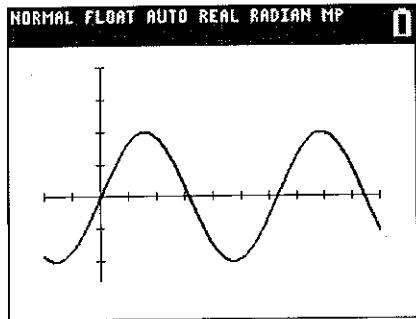
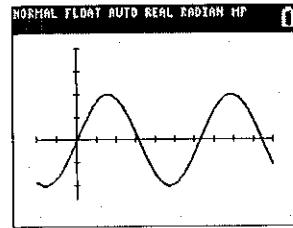
h.  $g(x) = f(|x|)$



3. Describe the circle with equation  $x^2 + y^2 - 6x + 4y - 36 = 0$  in terms of a transformation of the unit circle whose center is at the origin.

4. The figure to the right shows the graph of  $y = f(x)$ .

Sketch  $y = |f(x)|$ ;  $y = |f(x)| + 3$ ;  $y = -2 \cdot |f(x)|$ .



5. Given  $f(x) = \frac{1}{x}$  and  $f(x+4)$ .

a. Graph the function and the transformation using your calculator. Sketch the graphs.

b. List the domain, range, and asymptotes of the two functions.

c. What are the domain, range, and asymptotes of  $f^{-1}(x)$ ? Find  $f^{-1}(x)$ .

# Pre-Calculus Objective 1.01 Transformations

1. Let  $f(x) = x^2 - 4x$ . Determine the function for  $g(x)$ . Describe the transformation in words from 2.  $f(x)$  to  $g(x)$ .

a.  $g(x) = 2f(x)$

*vertical stretch by 2*

b.  $g(x) = f(2x)$

*horizontal compression by  $\frac{1}{2}$*

c.  $g(x) = -f(x)$

*flip across x-axis*

d.  $g(x) = f(-x)$

*flip across y-axis*

e.  $g(x) = f(x + 2)$

*left 2*

f.  $g(x) = f(x) - 4$

*down 4*

g.  $g(x) = |f(x)|$

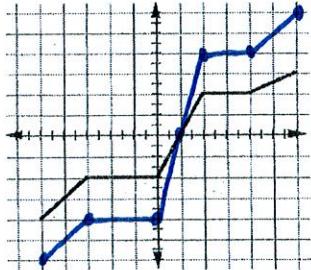
*anything negative or below  
x-axis is flipped across x-axis*

h.  $g(x) = f(|x|)$

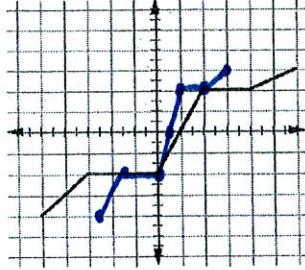
*anything to the right of the  
y-axis is flipped across y-axis*

2. If the graph of  $f(x)$  is given, sketch the graph of  $g(x)$ .

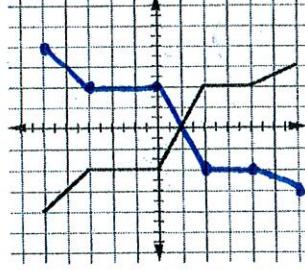
a.  $g(x) = 2f(x)$



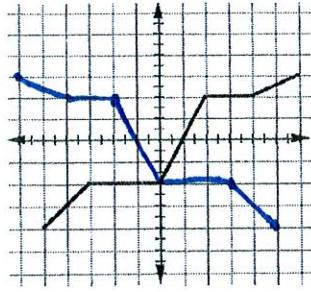
b.  $g(x) = f(2x)$



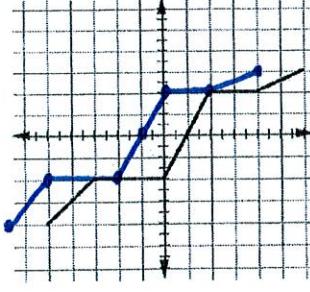
c.  $g(x) = -f(x)$



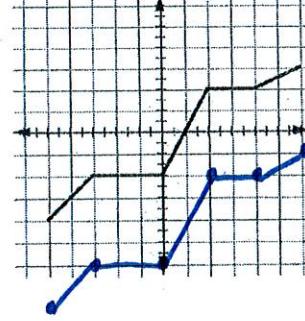
d.  $g(x) = f(-x)$



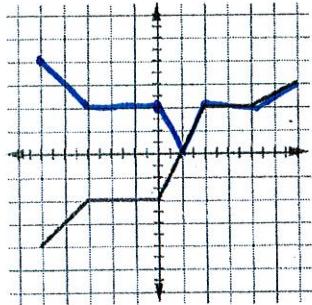
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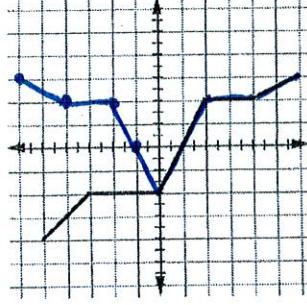
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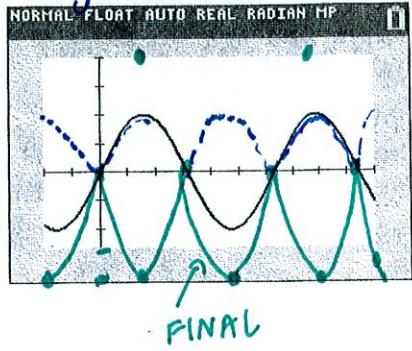
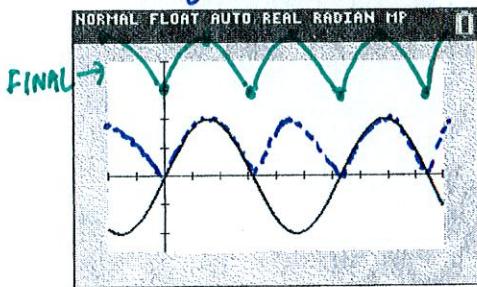
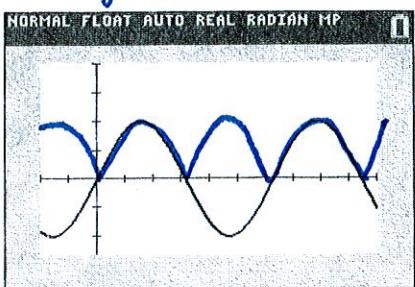
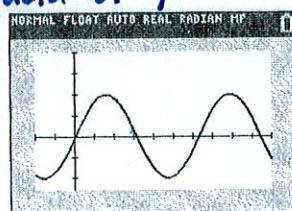
3. Describe the circle with equation  $x^2 + y^2 - 6x + 4y - 36 = 0$  in terms of a transformation of the unit circle whose center is at the origin.

$$\begin{aligned} x^2 - 6x + 9 + y^2 + 4y + 4 &= 36 + 9 + 4 \\ (x-3)^2 + (y+2)^2 &= 49 \quad \text{center } (3, -2) \text{ Radius } \Rightarrow 7 \end{aligned}$$

Right 3, Down 2, Radius stretched by a factor of 7

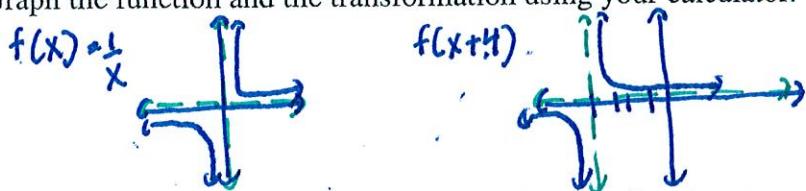
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Sketch  $y = |f(x)|$ ;  $y = |f(x)| + 3$ ;  $y = -2 \cdot |f(x)|$ .



5. Given  $f(x) = \frac{1}{x}$  and  $f(x+4)$ .

a. Graph the function and the transformation using your calculator. Sketch the graphs.



b. List the domain, range, and asymptotes of the two functions.

$$f(x) = \frac{1}{x} \quad D \rightarrow (-\infty, 0) \cup (0, \infty) \quad R \rightarrow (-\infty, 0) \cup (0, \infty) \quad \text{V.A.} \rightarrow x=0 \quad \text{H.A.} \rightarrow y=0$$

$$f(x+4) \quad D \rightarrow (-\infty, -4) \cup (-4, \infty) \quad R \rightarrow (-\infty, 0) \cup (0, \infty) \quad \text{V.A.} \rightarrow x=-4 \quad \text{H.A.} \rightarrow y=0$$

c. What are the domain, range, and asymptotes of  $f^{-1}(x)$ ? Find  $f^{-1}(x)$ .

$$D \rightarrow (-\infty, 0) \cup (0, \infty) \quad R \rightarrow (-\infty, 0) \cup (0, \infty) \quad \text{V.A.} \rightarrow x=0 \quad \text{H.A.} \rightarrow y=0$$

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

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

SAME FUNCTION

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