#2 Combining transformation Function Assign #2.doc

1. Suppose (12,5) is the point of the graph of f(x), for each of the following, name the image point

(12,5)

	Mapping Rule	Image Point
a. y= 5f(x + 9)-6	$(x,y) \Rightarrow (x-9, 5y-6)$	(3, 19)
b. y = f(-3(x-4))+2	$(x,y) \Rightarrow (-\frac{1}{3}x+4, y+2)$	(0,7)
c. y = -2f(x)+10	$(x,y) \Rightarrow (x, -2y+10)$	(12,0)
d. y = 4f(2x+12)-1	$(x,y) \Rightarrow (\frac{1}{2}x-6, 4y-1)$	(0, 19)
e. y = -3f($\frac{1}{4}$(x-2))+9	$(x,y) \Rightarrow (4x+2, -3y+9)$	(50, -6)

$\Rightarrow$ (d) $y = 4f(2x+12)-1$ rewrite:
$y = 4f(2(x+6))-1$

2. Write the **equation** of the following functions, given the transformations stated.

a. y = f(x) is vertically stretched by a factor of 6, reflected in the y-axis, translated 7 units to the left and translated 4 units downwards.

VR   HR ✓
VS ×6   HS
VT 4   HT 7 left
  down

$$y = 6f(-(x+7))-4$$

b. y = f(x) is horizontally stretched by a factor of $\frac{1}{5}$, reflected in both the x-axis and the y-axis, translated 11 units up.

VR ✓   HR ✓
VS   HS ×$\frac{1}{5}$
VT 11   HT
  up

$$y = -f(-5x)+11$$

c. y = f(x) is vertically stretched by a factor of 3, horizontally stretched by a factor of 8 and reflected in the x-axis and translated 9 units right

VR ✓   HR
VS ×3   HS ×8
VT   HT 9 Right

$$y = -3f\left(\frac{1}{8}(x-9)\right)$$

d. y = f(x) is vertically stretched by a factor of 7, translated 10 units left and 8 units down

VR   HR
VS ×7   HS
VT 8   HT 10
  down   left

$$y = 7f(x+10)-8$$

3. Given the graph of f(x), sketch the graph of the following functions, and state the domain and range for each:

a. $g(x) = -f(2(x-7))+10$

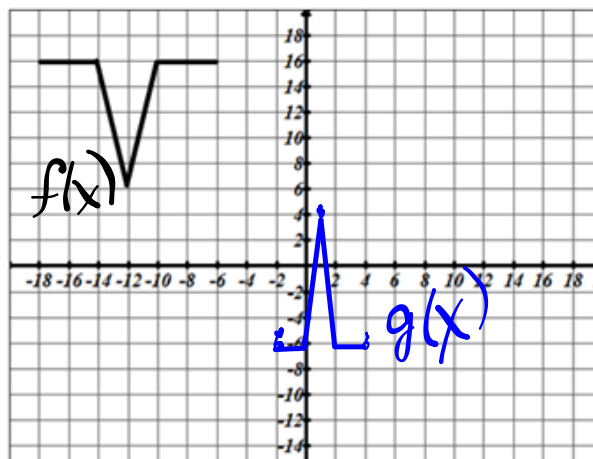$$(x,y) \rightarrow (\tfrac{1}{2}x+7, -y+10)$$

x	y
-18	16
-14	6
-12	6
-10	6
-6	16

x	y
-2	-6
0	-6
1	4
2	-6
4	-6

Domain f(x) $-18 \le x \le -6$

Range f(x) $6 \le y \le 16$

Domain g(x) $-2 \le x \le 4$

Range g(x) $-6 \le y \le 4$

b. h(x) = 3f(-(x-2)) + 10

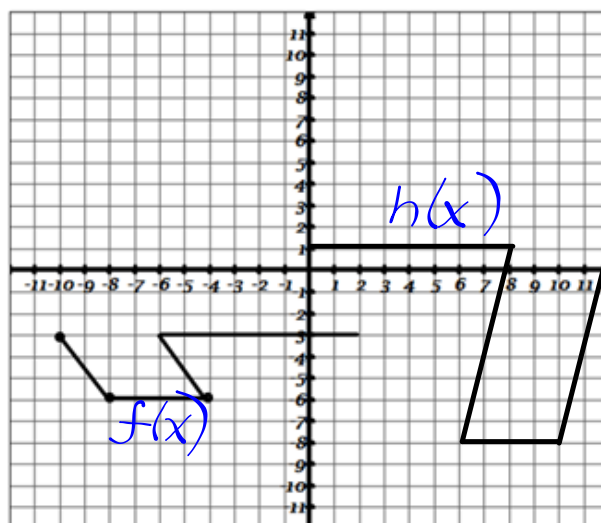$$(x,y) \rightarrow (-x+2, 3y+10)$$

x	y
-10	-3
-8	-6
-4	-6
-6	-3
2	-3

x	y
12	1
10	-8
6	-8
8	1
0	1

Domain f(x) -10≤x≤2

Range f(x) -6≤y≤-3

Domain h(x) 0≤x≤12

Range h(x) -8≤y≤1

c. $m(x) = -f(-\frac{1}{2}(x-7))-1$

$(x,y) \Rightarrow (-2x+7, -y-1)$

x	y
3	8
6	5
3	3
6	0

x	y
1	-9
-5	-6
1	-4
-5	-6
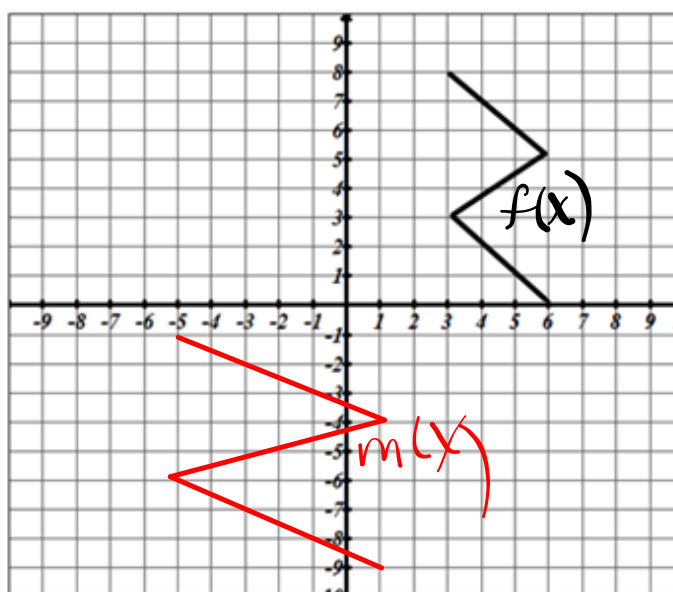
Domain f(x)   3≤x≤6
Range f(x)   0≤y≤8

Domain m(x)   -5≤x≤1
Range m(x)   -9≤y≤-1

4

4. Given the graph of   h(x), sketch h⁻¹(x)
   State the domain and range of h⁻¹(x)
   Are there any invariant points

$(3, -1)$

Domain h⁻¹(x) $-7 \leq x \leq -1$
Range h⁻¹(x) $2 \leq y \leq 6$

$(-2, 4)$ h(x) $(6, -4)$

$(5, -7)$
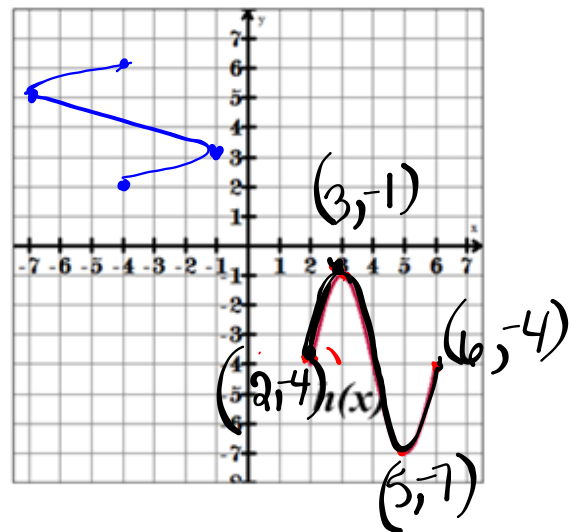
Inverse.

5. State The equation of the inverse:

a. $f(x) = 4(x+2)^2$

$y = 4(x+2)^2$

Inv: $x = 4(y+2)^2$

$\dfrac{x}{4} = (y+2)^2$

$\sqrt{\dfrac{x}{4}} = y+2$

$\sqrt{\dfrac{x}{4}} - 2 = y$

$$\boxed{f^{-1}(x) = \sqrt{\dfrac{x}{4}} - 2}$$

b. $f(x) = \dfrac{9x-3}{4x+1}$

$y = \dfrac{9x-3}{4x+1}$

Inv: $x = \dfrac{9y-3}{4y+1}$

$x(4y+1) = 9y-3$

$4xy + x = 9y - 3$

$4xy - 9y = -x - 3$

$y(4x-9) = -x-3$

$y = \dfrac{-x-3}{4x-9}$

$$\boxed{f^{-1}(x) = \dfrac{-x-3}{4x-9}}$$

c. $y = 5\sqrt{3x+1} + 11$

Inv: $x = 5\sqrt{3y+1} + 11$

$x - 11 = 5\sqrt{3y+1}$

$\dfrac{x-11}{5} = \sqrt{3y+1}$

$\left(\dfrac{x-11}{5}\right)^2 = 3y+1$

$\left(\dfrac{x-11}{5}\right)^2 - 1 = 3y$

$\dfrac{\left(\dfrac{x-11}{5}\right)^2 - 1}{3} = y$

$f^{-1}(x) = \dfrac{\left(\dfrac{x-11}{5}\right)^2 - 1}{3}$

OR $f^{-1}(x) = \dfrac{(x-11)^2 - 25}{75}$

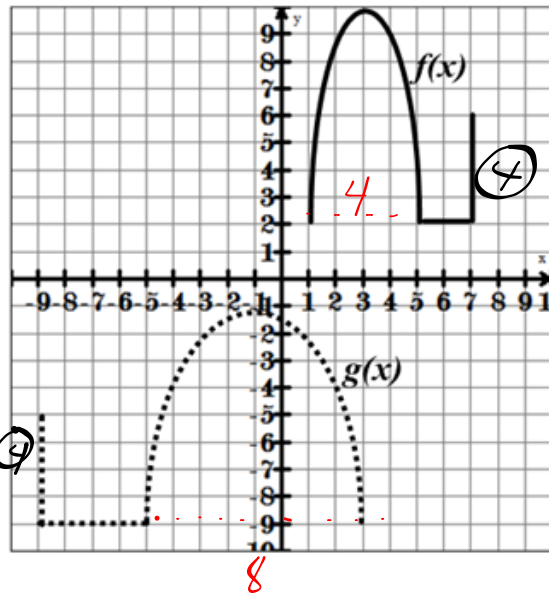6. Given f(x) describe the equation of
g(x) as a transformation of f(x)

VRX   HR ✓

VSX   HS × 2

VT   HT

$(x,y) \rightarrow (-2x+5, y-11)$

x	y
7	6
7	2
5	2

-9	-5
-9	-9
-5	-9

EQ'N $\rightarrow g(x) = f\left(-\tfrac{1}{2}(x-5)\right) - 11$

f(x)

④

g(x)

Attachments

#2 Combining transformation Function Assign #2.doc