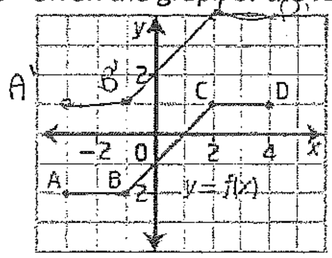
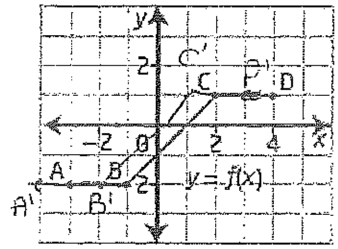
AK

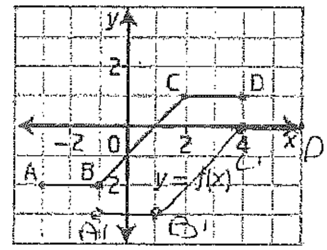
Outcome 1 Review

Level 2

1. Given the graph of the function $y = f(x)$, sketch the graph of each transformed function.





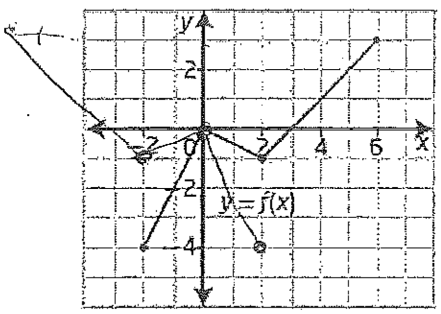


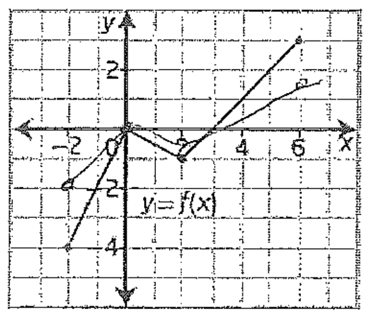
a) $y = f(x) + 3$ $(x, y) \to (x, y+3)$

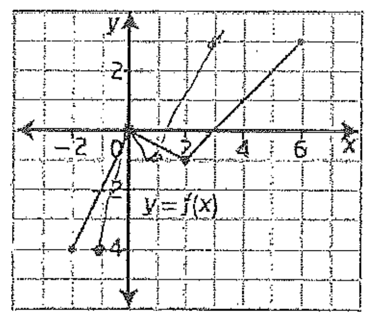
b) $h(x) = f(x + 1)$ $(x, y) \to (x-1, y)$

c) $y = f(x - 2) - 1$ $(x, y) \to (x+2, y-1)$

2. Using the graph below, graph each transformed function







a) $y = f(-x)$ $(x, y) \to (-x, y)$

h. reflection about y axis

b) $y = \frac{1}{2} f(x)$ $(x, y) \to (x, \frac{1}{2}y)$

c) $y = f(2x)$ $(x, y) \to (\frac{1}{2}x, y)$

3. Describe the transformation that can be applied to the graph of $f(x)$ to obtain the graph of the transformed function. State the values of a, b, h and k in $y = a\,f(b(x - h)) + k$

a) $y = f(x - 5) + 2$

$a = 1$ $h = 5$ translation 5 right and 2 up

$b = 1$ $k = +2$

b) $y = f(3x) - 5$

$a = 1$ $h = 0$ h. stretch factor of $\frac{1}{3}$ and

$b = 3$ $k = -5$ 5 units down.

c) $y = -f(x + 2)$

$a = -1$ $h = -2$ v. reflection about x axis and

$b = 1$ $k = 0$ 2 units left

d) $y = 4f(-x)$

$a = 4$ $h = 0$ V. stretch factor 4, h. reflection

$b = -1$ $k = 0$ about y-axis

e) $y=-2f(x)$ V. stretch factor of 2

$a=-2$ $h=0$ V. reflection about x-axis

$b=1$ $k=0$

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

$a=1$ $h=3$ h. stretch factor of $\frac{1}{4}$

$b=4$ $k=0$ h. translation 3 units right

g) $y=5f(-2x)+4$ V. stretch factor ~~of~~ 5 ~~h. stretc~~

$a=5$ $h=0$ h. reflection about y axis

$b=-2$ $k=4$ h. stretch factor $\frac{1}{2}$

V. translation up 4 units.

4. Determine the equation of the inverse of each function below algebraically.

a) $f(x)=3x-6$

$x=3y-6$

$+6 \quad +6$

$x+6=3y$

$y=\frac{x+6}{3}$ or $y=\frac{1}{3}x+2$

b) $f(x)=\frac{1}{3}(x+12)$

$\left(x=\frac{1}{3}(y+12)\right)3$

$3x=y+12$

$y=3x-12$

c) $f(x)=x^2-7$

$x=y^2-7$

$\pm\sqrt{x+7}=\sqrt{y^2}$

$y=\pm\sqrt{x+7}$

d) $y=(x-5)^2-9$

$x=(y-5)^2-9$

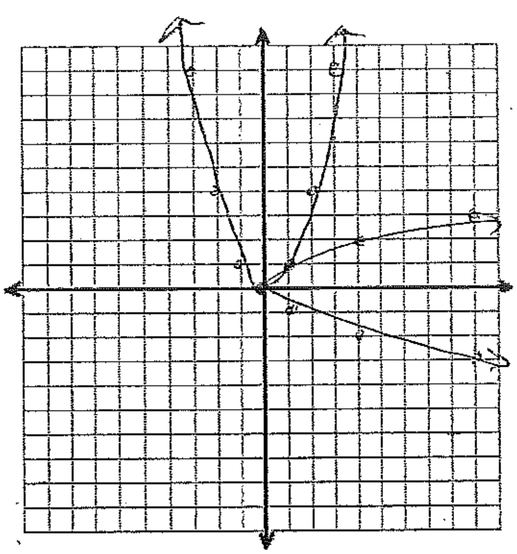
$\pm\sqrt{x+9}=\sqrt{(y-5)^2}$

$\pm\sqrt{x+9}=y-5$

$y=\pm\sqrt{x+9}+5$

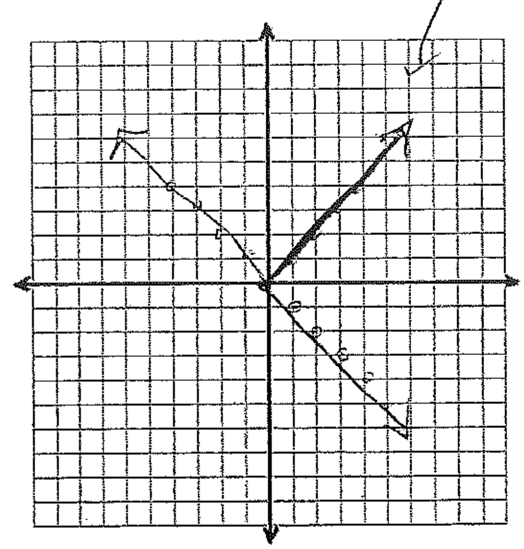
5. Graph each function and its inverse on the same grid.

a) $y=x^2$



b) $y=|x|$

on both f(x) and $f(x)^{-1}$

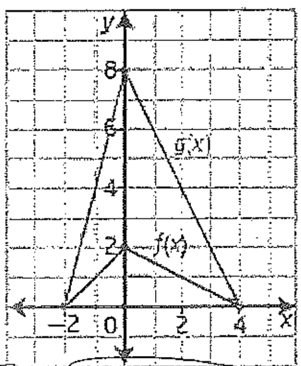


Level 3

6. For each function pair below, state how f(x) was transformed to create g(x) in the form of

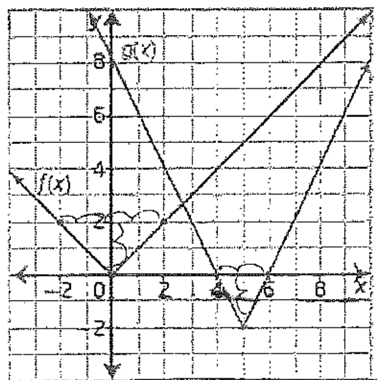
g(x) = af(b(x-h)+k

a)



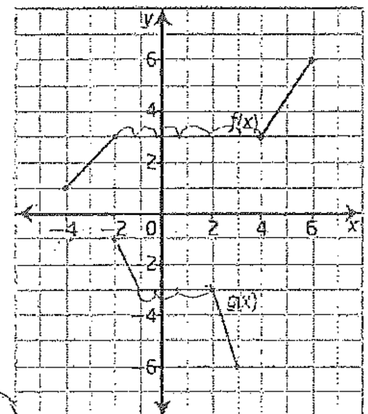
$g(x) = 4f(x)$

b)



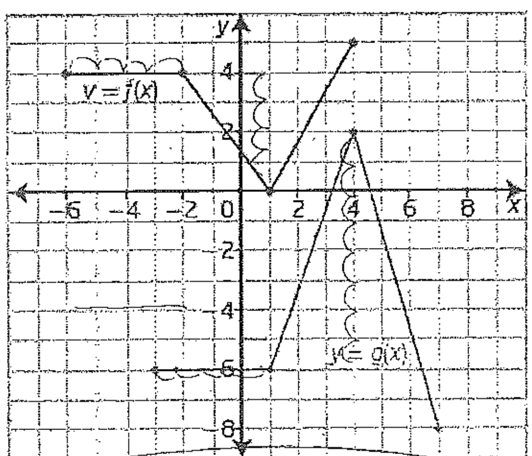
$g(x) = f(2(x-5))-2$

c)



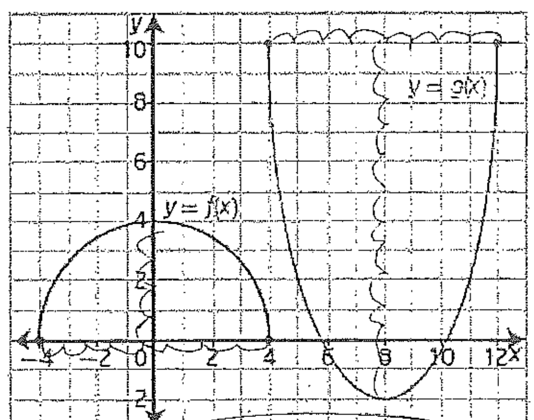
$g(x) = -f(2x)$

d)



$g(x) = -2f(x-3)+2$

e)



$g(x) = 3f(x-8)+10$

7. Write the equation for each transformation of $y = x^2$ in the form $y = af(b(x-h)) + k$.

a) a vertical stretch by a factor of 3, reflected in the *y*-axis, and translated 3 units left and 2 units down

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

b) a horizontal stretch by a factor of 2, reflected in the *x*-axis, and translated 7 units up

$y = -f(\frac{1}{2}x)+7$

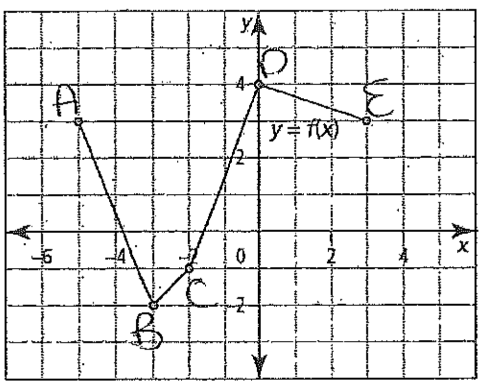
c) a horizontal stretch by a factor of $\frac{1}{4}$, translated 5 units right and 1 unit down

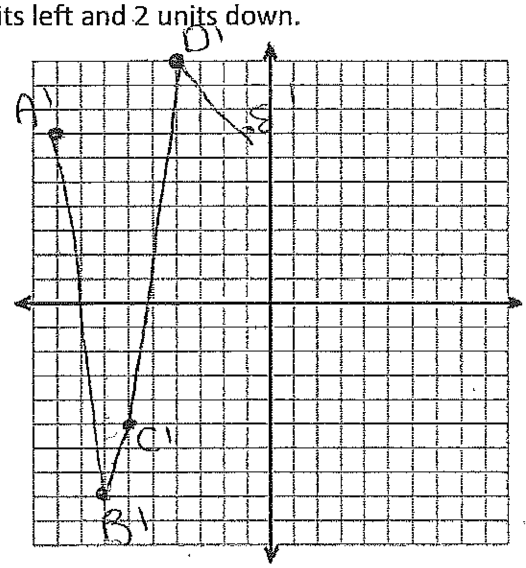
$y = f(4(x-5)) - 1$

d) a vertical stretch by a factor of $\frac{1}{3}$, a horizontal stretch by a factor of $\frac{1}{2}$, and reflected in the x-axis

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

8. Here is the graph of y=f(x).
   a) On the coordinate plane provided, sketch and label its image after a vertical stretch by a factor of 3, and a translation of 4 units left and 2 units down.





$(x, y) \rightarrow (x-4, 3y-2)$
$(-5, 3) \rightarrow (-9, 7)$
$(-3, -2) \rightarrow (-7, -8)$

   b) Write the equation of the transformed image in the form **y = a f(b(x-h))+k.**

$(-2, -1) \rightarrow (-6, -5)$
$(0, 4) \rightarrow (-4, 10)$
$(3, 3) \rightarrow (-1, 7)$

$y = 3f(x+4) - 2$

9. If the x-intercept of the graph of $y = f(x)$ is $(a, 0)$ and the y-intercept is $(0, b)$, determine the x-intercept and y-intercept after the following transformations of the graph.

a) $y = 3f(x-7)+2$ $(x, y) \rightarrow (x+7, 3y+2)$

$(a, 0) \rightarrow (a+7, 2)$
$(0, b) \rightarrow (7, 3b+2)$

b) $y = f(-0.25x) - 7$

$(x, y) \rightarrow (-4x, y-7)$
$(a, 0) \rightarrow (-4a, -7)$
$(0, b) \rightarrow (0, b-7)$

c) $y + 3 = 4f(x+10) - 3$

$(x, y) \rightarrow (x-10, 4y-3)$
$(a, 0) \rightarrow (a-10, -3)$
$(0, b) \rightarrow (-10, 4b-3)$

d) $y = -f(2x) - 6$

$(x, y) \rightarrow$ ~~$(\frac{y-6}{a}$~~ $(\frac{1}{2}x, -y-6)$
$(a, 0) \rightarrow (a/2, -6)$
$(0, b) \rightarrow (0, -b-6)$

10 ~~9~~. Determine the equation for the inverse of each function below.

a) $f(x) = -6x + 5$

$x = -6y + 5$

$-5 \qquad -5$

$\frac{x-5}{-6} = \frac{-6y}{-6}$

$f(x)^{-1} = y = \frac{x-5}{-6} = \frac{-(x-5)}{6}$

b) $f(x) = \frac{x-3}{8}$

$x = \frac{y-3}{8}$

$8x = y - 3$

$\boxed{y = 8x + 3}$

$\boxed{f(x)^{-1} = 8x + 3}$

c) $f(x) = (x-1)^2 - 2$

$x = (y-1)^2 - 2$

$+2 \qquad +2$

$\pm\sqrt{x+2} = \sqrt{(y-1)^2}$

$\pm\sqrt{x+2} = y - 1$

$+1 \qquad +1$

$f(x)^{-1} = y = \pm\sqrt{x+2} + 1$

Level 4.

11 ~~10~~. Using $f(x) = x^2$, graphing $y = -4f(2x-6) + 3$

$= -4f(2(x-3)) + 3$

Base $y = x^2$

$(x, y) \rightarrow (\frac{1}{2}x + 3, -4y + 3)$

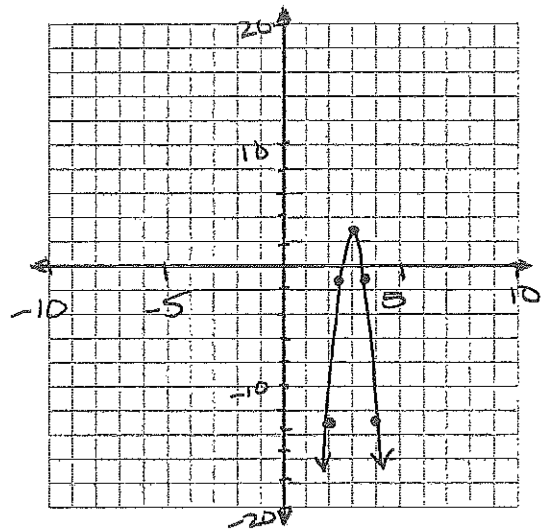
$(-2, 4) \rightarrow (2, -13)$

$(-1, 1) \rightarrow (2.5, -1)$

$(0, 0) \rightarrow (3, 3)$

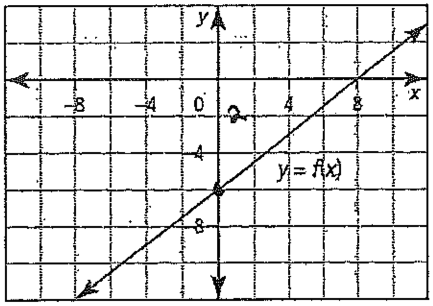
$(1, 1) \rightarrow (3.5, -1)$

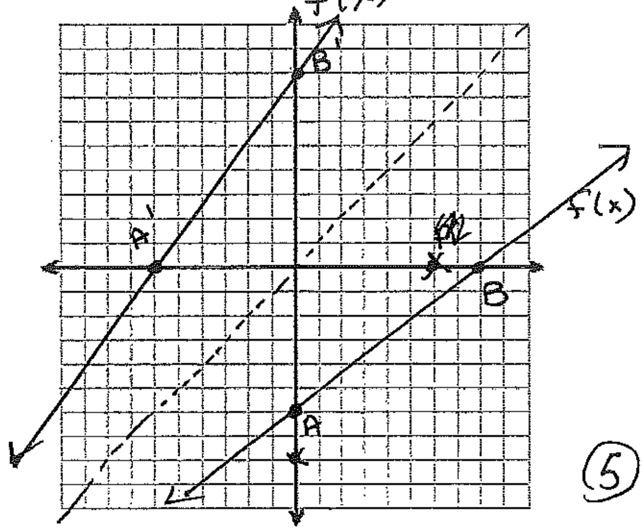
$(2, 4) \rightarrow (4, -13)$



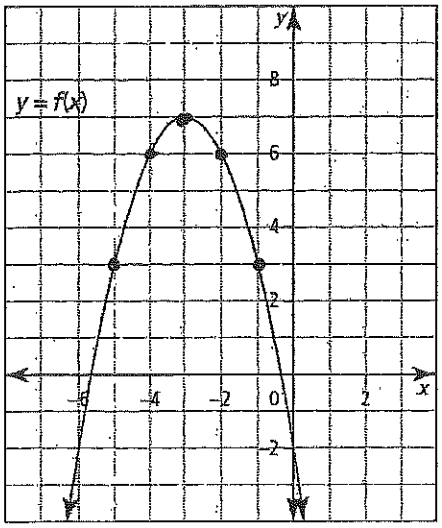
12 ~~11~~. Copy each graph of $y = f(x)$. Then, sketch the graph of its inverse, $x = f(y)$. Determine whether the inverse is a function. If the inverse is not a function, restrict the domain of f(x) so $f(x)^{-1}$ is a function

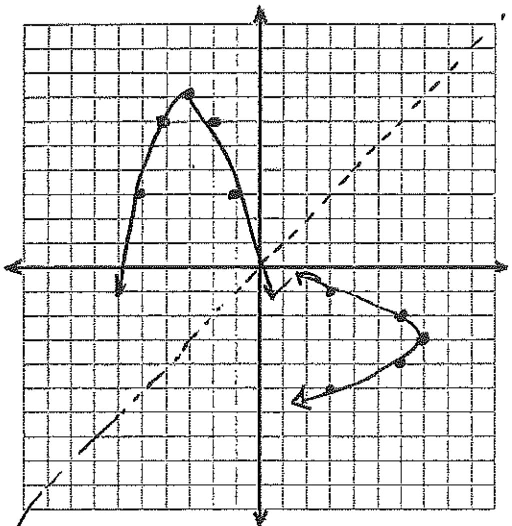
a) $f(x)^{-1}$ is a function





b)





$f^{-1}(x)$ not a function.

Restrict domain to

$[-\infty, -3)$

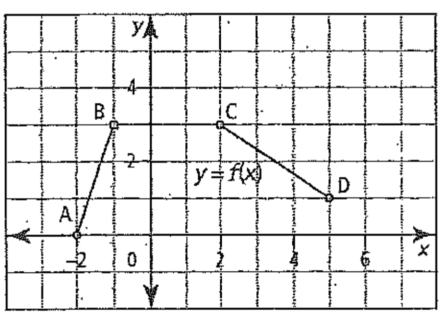
$\{x \mid x \leq -3, x \in \mathbb{R}\}$

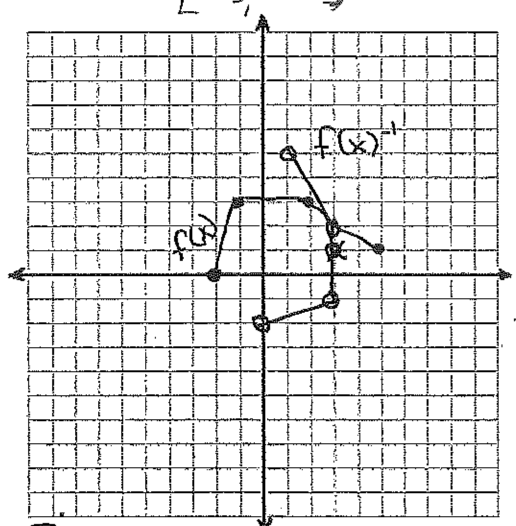
or

$\{x \mid x \geq -3, x \in \mathbb{R}\}$

$[-3, \infty)$

c)





$f^{-1}(x)$ not a function.

Restrict domain to

$\{x \mid -2 \leq x \leq -1, x \in \mathbb{R}$

or $[-2, -1]$

$\{x \mid 2 \leq x \leq 5, x \in \mathbb{R}\}$

$[2, 5]$