

First name: _____ Last name: _____

Student ID: _____

Transformations of Functions (2) Homework

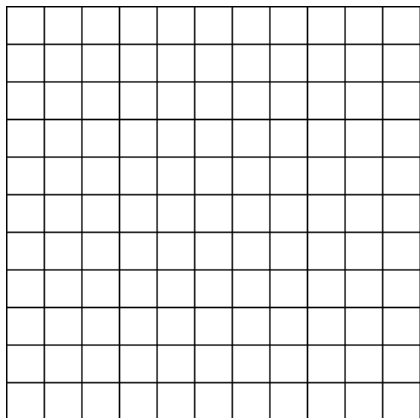
1. Determine the inverse of given ordered pairs, and state whether the inverse is a function.

a) $f = \{(0, 2), (1, 3), (2, 4), (3, 5)\}$

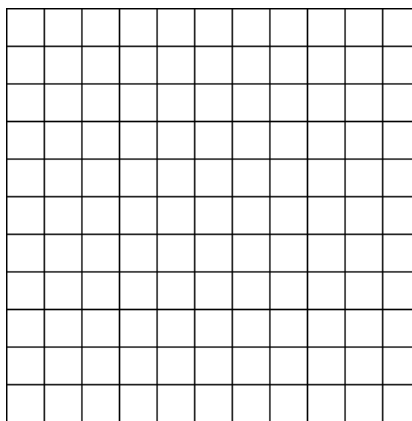
b) $g = \{(4, -2), (2, 1), (1, 3), (0, -2), (-3, -3)\}$

2. Determine whether or not the inverse of following functions is a function. Graph the function and its inverse on the same grid.

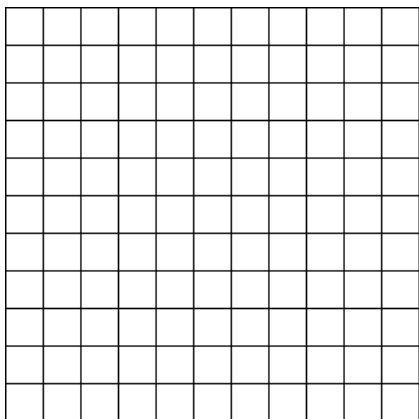
1) $f(x) = 3x + 2$



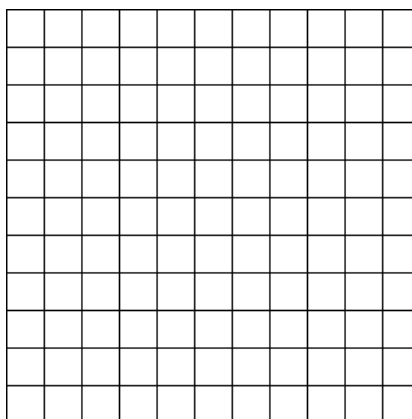
2) $f(x) = 6 - \frac{1}{2}x$



3) $f(x) = x^2 + 2$

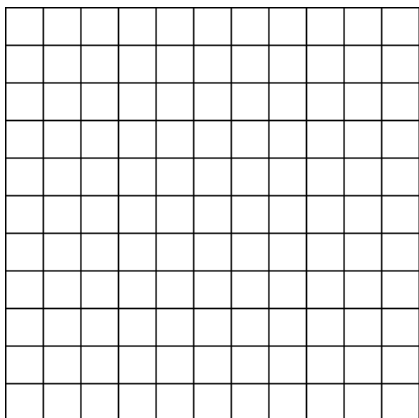


4) $f(x) = |x|$

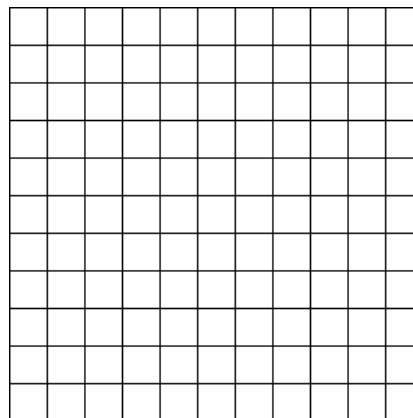


3. Perform the following transformations to the function $y = x^2$. In each case, write the formula that gives the requested transformation and draw the graph of the transformed function.

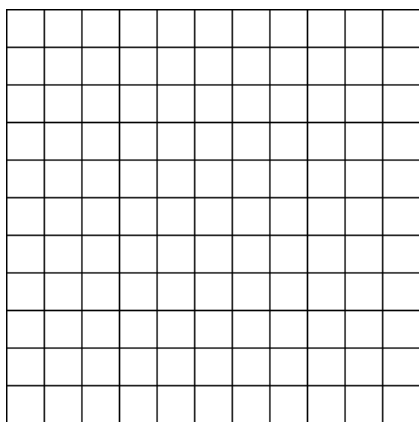
1) a horizontal expansion by a factor of 4.



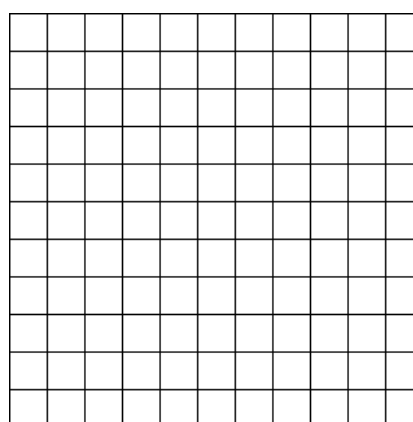
2) a horizontal compression by a factor of $1/4$.



3) a vertical expansion by a factor of 4.



4) a vertical compression by a factor of $1/4$.



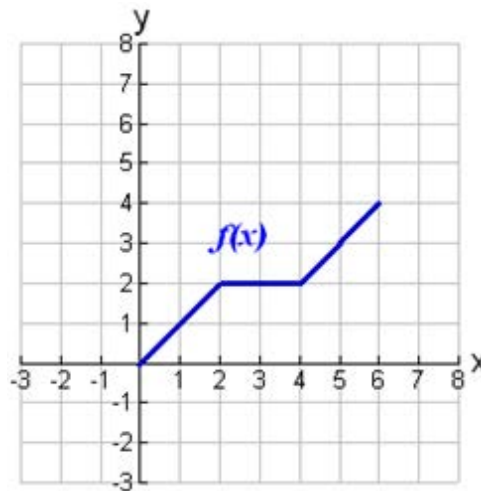
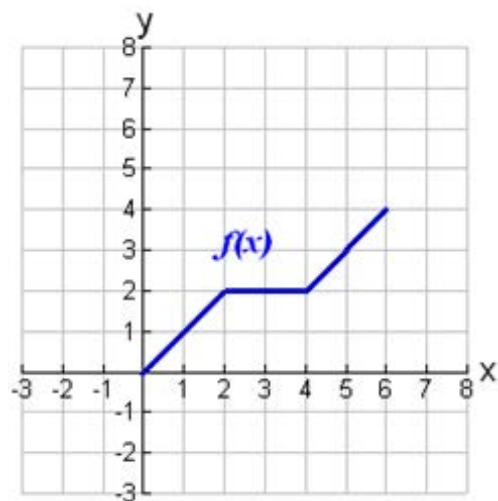
4. Find the function formula giving function notation. Describe the transformations that would produce the graph of the second function from the graph of the first function.

1) $f(x) = |x| \rightarrow g(x) = 5f(x) + 7$

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

5. Given the graph of the function $f(x)$ shown below, sketch the graphs of

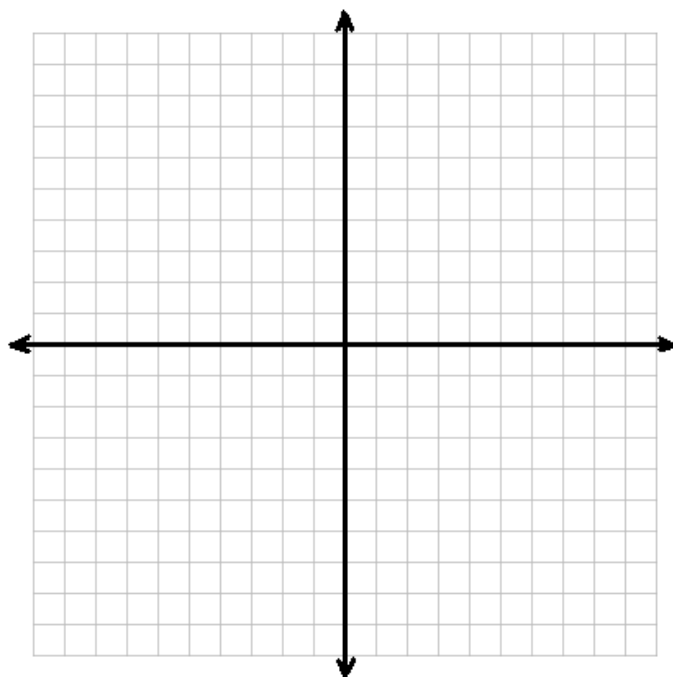
- 1) $f(x + 1)$ 2) $f(x) - 2$ 3) $f(-x)$ (sketch part 1-3 on the first graph)
 4) $-f(x)$ 5) $2f(x)$ 6) $f(1/2 x)$ (sketch part 4-6 on the second graph)



6. A function is defined as $f(x) = -(x-5)^2$

a) Find its inverse.

b) Sketch the graph of $f(x)$ and its inverse on the same axes.



c) Is the inverse a function? Explain.

d) Restrict the domain of $f(x)$ so that the inverse is a function.

e) In how many ways can you restrict the domain so that the inverse is a function?

f) In how many ways can you restrict the domain so that the inverse is NOT a function?

7. Consider the relationship between Fahrenheit and Celsius temperatures.

$$y = x \text{ and } y = \frac{5}{9}(x - 32)$$

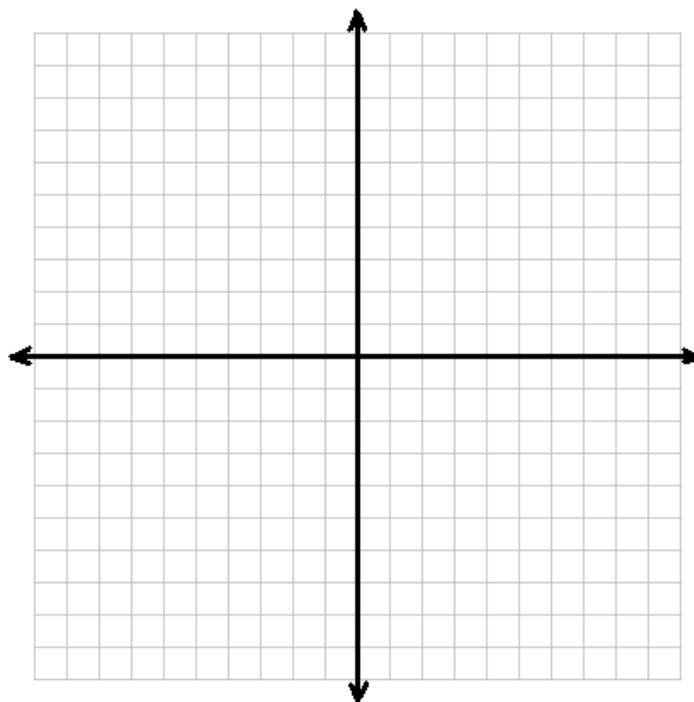
1) Describe in transformational terms, how the first graph becomes the second graph.

2) At what temperature are the Fahrenheit and Celsius readings the same?

8. a) Sketch the graph of the function $f(x) = \sqrt{x}$

b) On the same set of axes, graph $y = f^{-1}(x)$, $y = f^{-1}(-x)$, and $y = -f^{-1}(-x)$.

c) Compare the graphs of $y = f(x)$ and $y = -f^{-1}(-x)$. If the graph of $y = -f^{-1}(-x)$ is drawn from the graph of $y = f(x)$ by a single reflection, what is the equation of the reflection line?

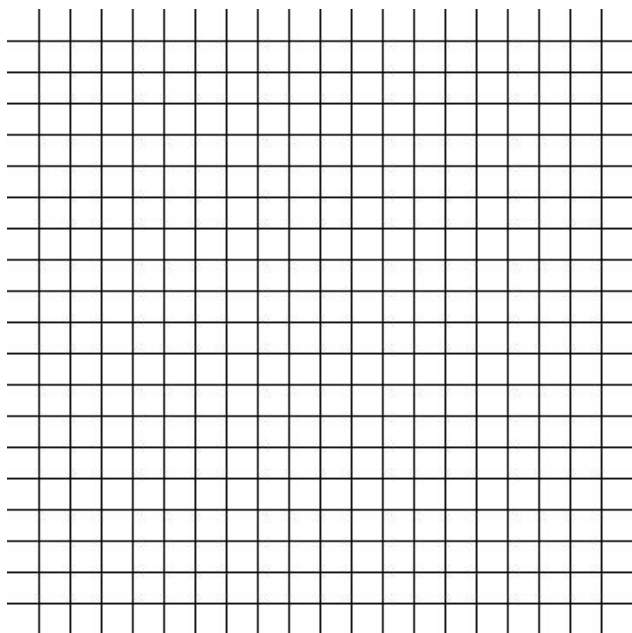


9. Graph the following functions using transformation. Remember to label the asymptotes where necessary.

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

Base Function: _____

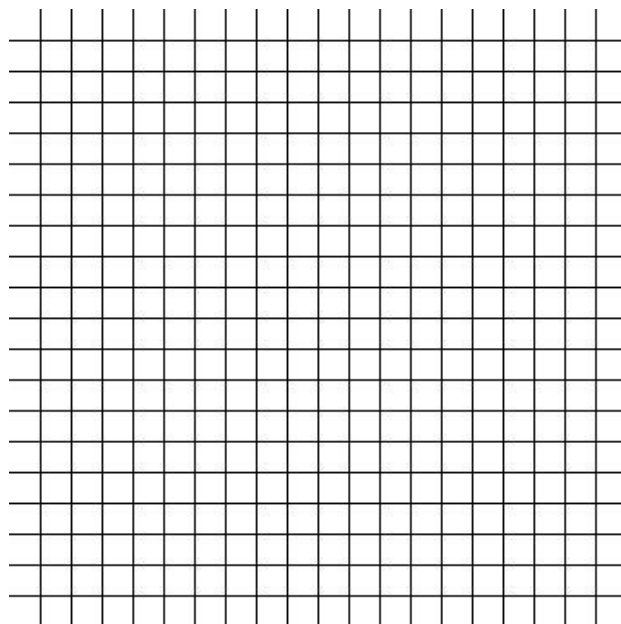
Transformations: _____



b) $f(x) = 2|x-6| - 5$

Base Function: _____

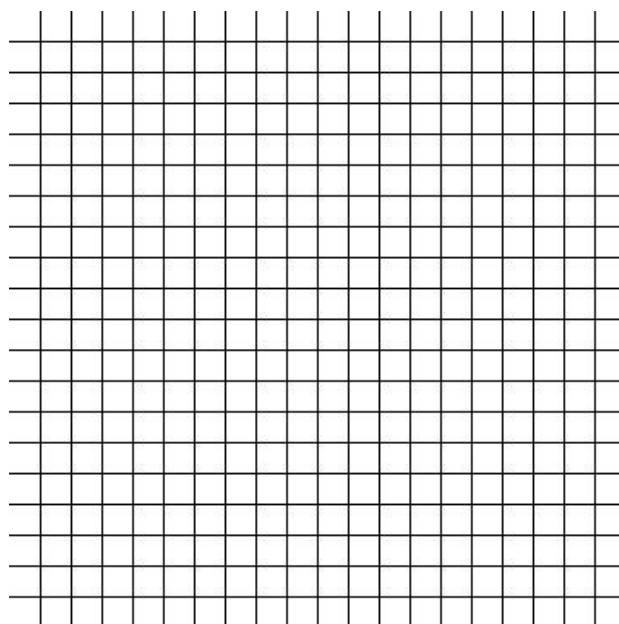
Transformations: _____



c) $f(x) = \frac{1}{2}\sqrt{-3x+6}$

Base Function: _____

Transformations: _____



Challenge Given $f(x) = x^2 - 2x$

- a) Determine an expression for $h(x)$, if $h(x) = f(-x)$.
- b) Determine an expression for $g(x)$, if $g(x)$ is represented by the rotation of 180° of $f(x)$ about the origin.
- c) Rotate $f(x)$ 90° about the origin. Find the coordinates of the point(s) for which $x = -1$, under the rotation.