Name:_____                          Date:_____

## Pre Calculus 12: HW Section 1.5 Combined Transformations

1. Indicate what the function $y = f(x)$ will become after each transformation in the specified order:

| | |
|---|---|
| a) 1. Horizontal Shift of 3 units left<br>   2. Horizontal expansion and reflection by a factor 3 | b. 1. Horizontal Expansion and reflection by a factor of 3<br>   2. Horizontal Shift of 3 lefts left |
| c) A vertical compression by a factor of -0.75<br>Vertical shift of 8 units up | d) Vertical shift of 8 units up and then a vertical compression by a factor of -0.75 |
| e) A vertical expansion by a factor of 2 and then a reflection over the x-axis. Then a horizontal compression by a factor of 0.25. | f) A horizontal shift of 3 units left and 2 units up. Then a reflection on both axis. Then a HE of 3 and VC of 0.3. |

2. When two transformations are performed in different orders, will the resulting function always be the same or always different? Explain:

3. Given the transformation: $y = \sqrt{x} \rightarrow y = \sqrt{2x - 6}$ indicate the transformation in order:

4. Given the transformation: $y = x^3 \rightarrow y = 3x^3 - 8$ indicate the transformation in order:

5. Given the transformation: $y = x^3 \rightarrow y = 3(3x - 6)^3 - 8$ indicate the transformation in order:

6. The function $y = \sqrt{x}$ is horizontally expanded by a factor of 4. With what VE/VC will result in the same equation?

7. For what factor "K" will the transformation of $y = f(x) \rightarrow ky = f(x)$ transform the function from $y = x^2 \rightarrow y = (4x)^2$ ?

8. What is the transformation required to convert $y = (x-3)^2 \rightarrow y = (4x-12)^2$ ? Name two different sets of solutions:

9. Indicate all the transformations that is required to change from $y = f(x)$ to the equation give:

| a) $y = f\left(\dfrac{2}{3}x - 1\right)$ | b) $y = -\dfrac{2}{3}f(x) + \dfrac{4}{5}$ |
|---|---|
| | |

| c) $y = 4f(-2x)$ | d) $y = 2f(3y+4)+5$ |
|---|---|
| e) $\dfrac{1}{2}y = f\left(\dfrac{1}{3}x - \dfrac{1}{4}\right) + \dfrac{1}{5}$ | f) $y = 3f\left(\dfrac{1}{5}(2x-3)\right)$ |

10. Given the four transformations in the given order, what will function $y = f(x)$ result in?
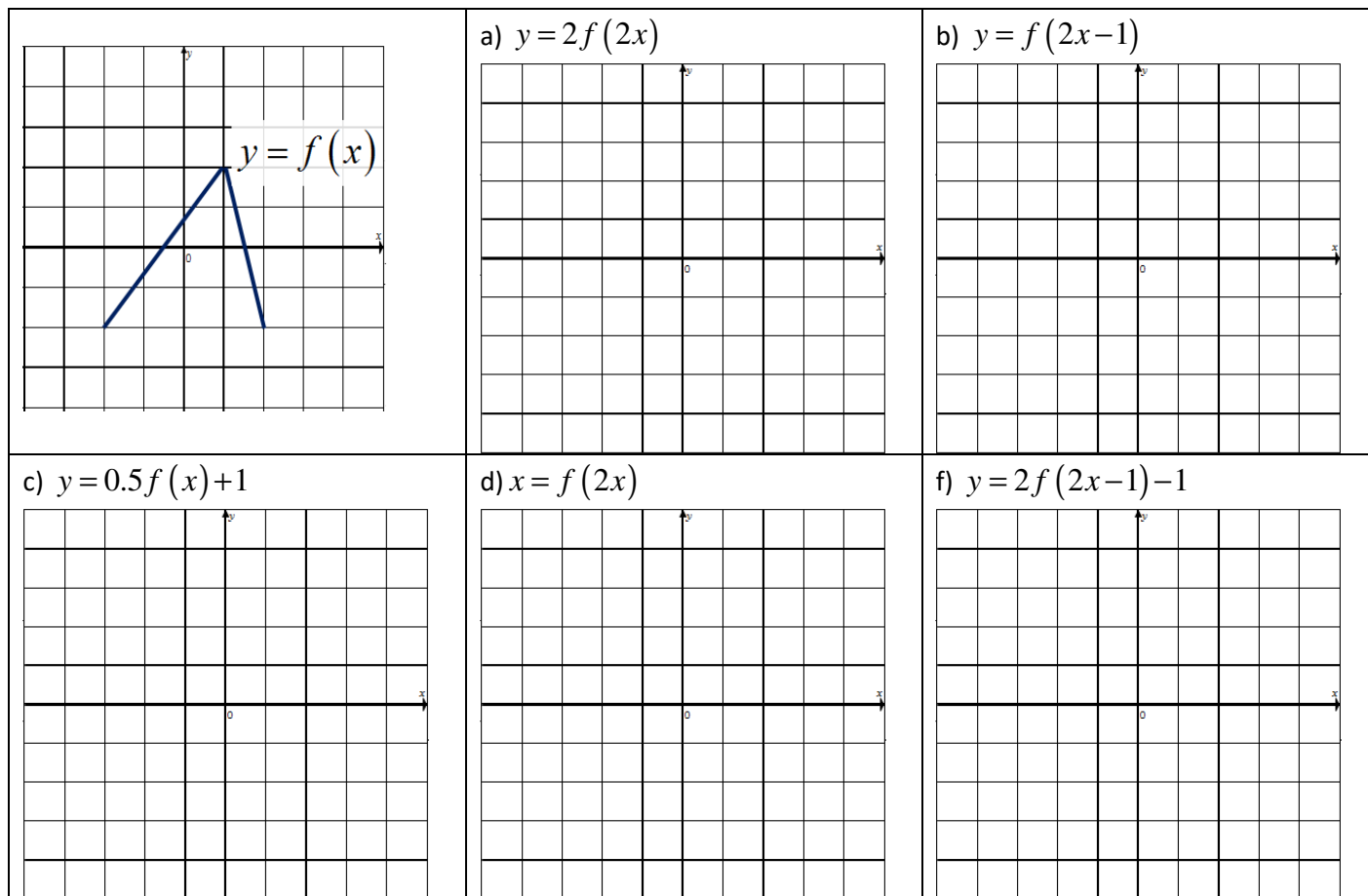
a)  1st) $x \to -\dfrac{1}{2}x$      2nd) $y \to \dfrac{-y}{4}$    3rd) $x \to x+4$    4th) $y \to y-12$

b)  1st) $x \to 2-x$      2nd) $y \to 5-\dfrac{1}{2}y$    3rd) $y \leftrightarrow x$    4th) $y \to y+4$
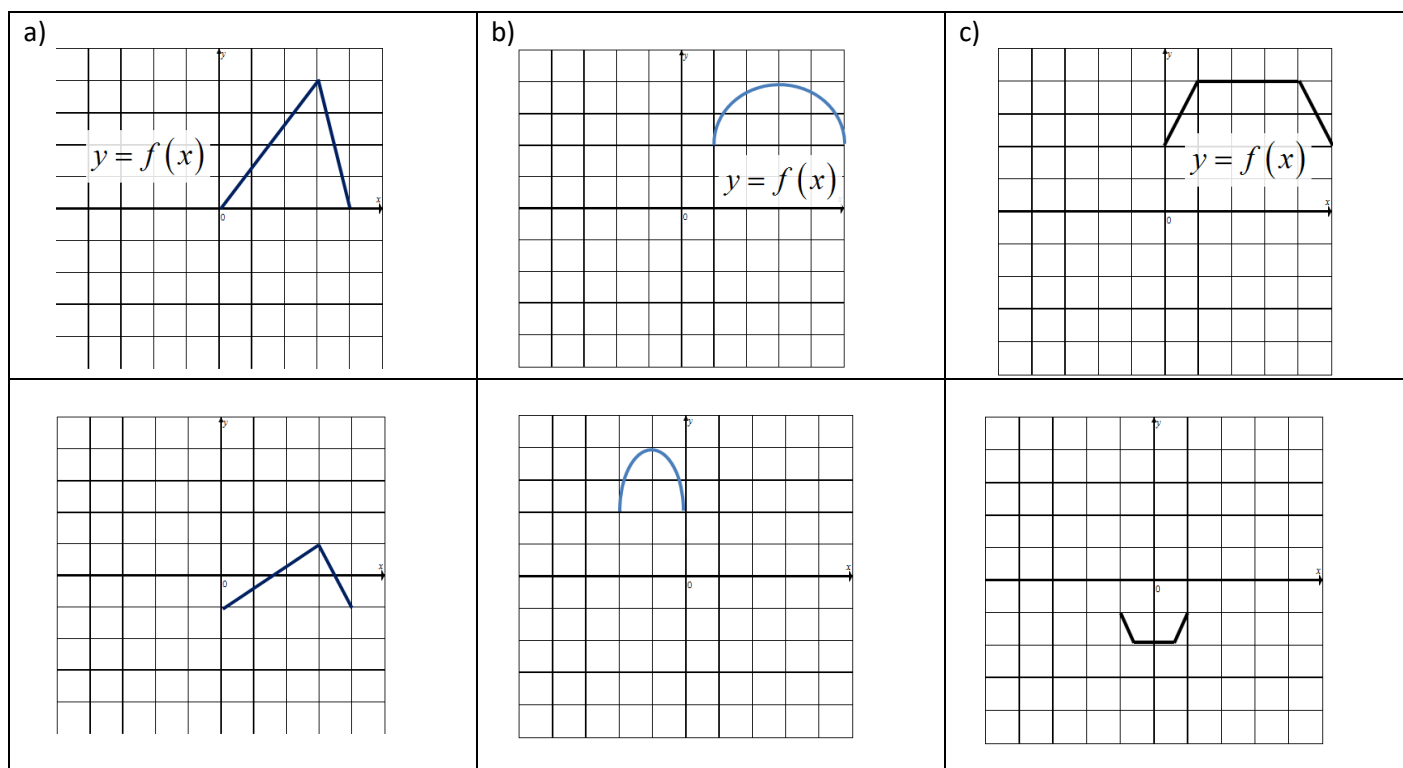
11. Point (e,f) is on the graph of $y = f(x)$, what point must be on the following functions:

| a) $y = -\dfrac{1}{4}f(x-3)$ | b) $\dfrac{-3}{4}y = f(10-4x)+1$ |
|---|---|
|  |  |

12. Given the graph of $y = f(x)$, draw the graph of the following functions:

| | a) $y = 2f(2x)$ | b) $y = f(2x-1)$ |
|---|---|---|
| $y = f(x)$ | | |
| c) $y = 0.5f(x)+1$ | d) $x = f(2x)$ | f) $y = 2f(2x-1)-1$ |

13. Given the graph of $y = f(x)$ on top, what is the equation of the corresponding graph below it:

a)

$y = f(x)$

b)

$y = f(x)$

c)

$y = f(x)$

14. Indicate the transformation required to go from the left function to the right.  List the transformation in order:

a) $y = \sqrt{x} \rightarrow y = \sqrt{5-3x}$

b) $y = 3^x \rightarrow y = 4\left(3^{2x+1}\right) - 6$

c) $y = \sqrt{x} \rightarrow y = 12\sqrt{-x-12} + 11$

d) $y = |2x+1| \rightarrow y = 3\left|\frac{4}{5}x+12\right| - 1$