

HOMWORK: COMPOSITE AND INVERSE FUNCTIONS

NAME: _____ DAY 7 DUE: _____

1. Use the table to answer the questions.

x	-3	-2	-1	0	1	2	3
f(x)	-7	-5	-3	-1	3	5	5
g(x)	8	3	0	-1	0	3	8

- a. $(f \circ g)(1) = \boxed{-1}$ b. $(f \circ g)(-1) = \boxed{-1}$ c. $(g \circ f)(-1) = \boxed{8}$
 d. $(g \circ f)(0) = \boxed{0}$ e. $(g \circ g)(-2) = \boxed{8}$ f. $(f \circ f)(-1) = \boxed{-7}$

Find the domain of each composite function given: $f(x) = \frac{3}{x-1}$ and $g(x) = \frac{2}{x}$

2. $(f \circ g)(x) =$
 $= f(g(x))$
 $= \frac{3}{\frac{2}{x} - 1}$
 $= \frac{3}{\frac{2-x}{x}}$
 $= \frac{3x}{2-x}$

$f(g(x)): x \neq 2$
 $g(x): x \neq 0$
 $D: \mathbb{R}, x \neq 0, 2$

3. $(f \circ f)(x) =$
 $= f(f(x))$
 $= \frac{3}{\frac{3}{x-1} - 1}$
 $= \frac{3}{\frac{3-x+1}{x-1}}$
 $= \frac{3(x-1)}{3-x+1}$

$f(f(x)): x \neq 4$
 $f(x): x \neq 1$
 $D: \mathbb{R}, x \neq 1, 4$

Find the domain of each composite function given: $f(x) = x^2 + 1$ and $g(x) = \sqrt{x-1}$

4. $(g \circ f)(x) =$
 $= g(f(x))$
 $= \sqrt{x^2 + 1 - 1}$
 $= \sqrt{x^2}$
 $= x$

Domain
 $g(f(x)): \mathbb{R}$
 $f(x): \mathbb{R}$
 $D: \mathbb{R}$

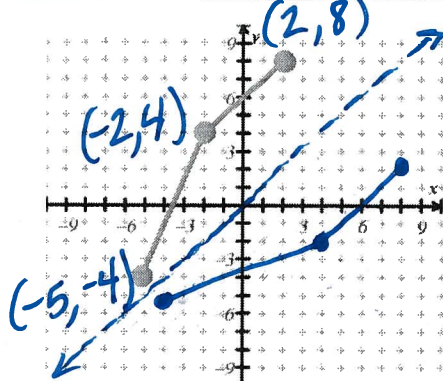
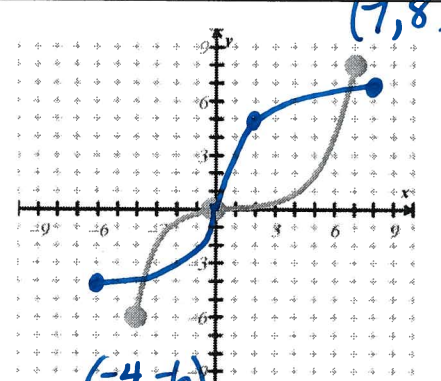
5. $(g \circ g)(x) =$
 $= g(g(x))$
 $= \sqrt{\sqrt{x-1} - 1}$

Domain
 $g(g(x)): x-1 \geq 0$
 $x \geq 1$
 $g(x): x \geq 1$
 $D: x \geq 1$

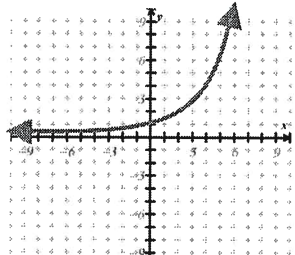
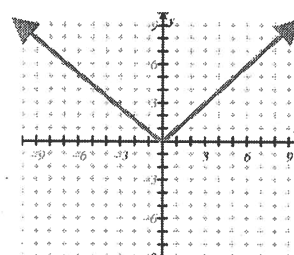
Find functions $f(x)$ and $g(x)$ so that $(f \circ g) = H$.

<p>6. $H(x) = (2x + 3)^4$</p> <p>$f(x) = \underline{x^4}$</p> <p>$g(x) = \underline{2x + 3}$</p>	<p>7. $H(x) = \sqrt{x^2 + 1}$</p> <p>$f(x) = \underline{\sqrt{x}}$</p> <p>$g(x) = \underline{x^2 + 1}$</p>
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Draw the graph of the inverse function.

<p>8.</p> 	<p>9.</p> 
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Use the horizontal line test to determine if each function is one-to-one.

<p>10.</p>  <p style="text-align: center;">Yes</p>	<p>11.</p>  <p style="text-align: center;">No</p>
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12. The function $y = |x|$ is not one-to-one. Find a suitable restriction on the domain of f so that the new function that results is one-to-one. Then find the inverse of f .

$$y = x, x \geq 0$$

$$f(x) = x, x \geq 0$$

$$f^{-1}(x) = x, x \geq 0$$

13. If a function, f , is even, can it be one-to-one? Why? *No. Even functions have symmetry about the y-axis.*

14. If a graph of a function and its inverse intersect, where must this necessarily occur? Why? *They will intersect on the line $y = x$.*