Solutions

Worksheet: Function Combinations & Inverses

Assigned 3/3/15

① a). $(f+g)(4) = f(4) + g(4)$
$= 4+1 + \sqrt{4}$
$= 5 + 2 = 7$

b). $\left(\frac{f}{g}\right)(9) = \frac{f(9)}{g(9)}$
$= \frac{9+1}{\sqrt{9}} = \boxed{\frac{10}{3}}$

c). $(f \circ g)(9) = f(g(9))$ $\quad g(9) = \sqrt{9} = 3$
$f(3) = 3+1$
$= \boxed{4}$

d) $(g \circ f)(9) = g(f(9))$ $\quad f(9) = 9+1 = 10$
$g(10) = \boxed{\sqrt{10}}$

② a) $(f-g)(x) = f(x) - g(x)$
$= 2x - (3x-4)$
$= 2x - 3x + 4$
$\boxed{(f-g)(x) = -x + 4}$

b) $(fg)(x) = (2x)(3x-4)$
$\boxed{(fg)(x) = 6x^2 - 8x}$

c) $(f \circ g)(x) = 2(3x-4)$
$\boxed{(f \circ g)(x) = 6x - 8}$

d). $(g \circ f)(x) = 3(2x) - 4$
$\boxed{(g \circ f)(x) = 6x - 4}$

③

Function	Domain
$f(x)$	$\{x \mid x = \mathbb{R}\}$
$g(x)$	$\{x \mid x = \mathbb{R}\}$
$\left(\frac{f}{g}\right)(x)$	$\{x \mid x \neq 4\}$

④

function	Domain
$f(x)$	$\{x \mid x \geq 0\}$
$g(x)$	$\{x \mid x = \mathbb{R}\}$
$(f \circ g)(x)$	$\{x \mid x \geq 2\}$

(5) $(g \circ f)(x) = 0.25(x-10)$

d.

(6) $f(g(x)) = 2\left(\frac{1}{2}(x+1)\right) - 1$

$= x+1-1 = x$ ✓

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

$= \frac{1}{2}(2x)$

$= x$ ✓

yes f & g are inverses

(7) $f(g(x)) = 3-(3-x)$

$= 3-3+x = x$ ✓

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

$= 3-3+x$

$= x$ ✓

yes f & g are inverses

(8) $y = 6x+1$

Inverse

$x = 6y+1$

$x-1 = 6y$

$\frac{x-1}{6} = y$

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

(9) Inverse

$x = \frac{3y}{y-5}$

$(y-5)x = 3y$

$yx-5x = 3y$

$yx-3y = 5x$

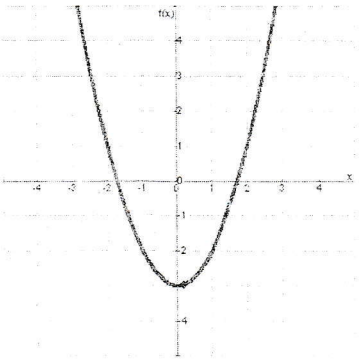
$y(x-3) = 5x$

$y = \frac{5x}{x-3}$

$\boxed{f^{-1}(x) = \frac{5x}{x-3}}$

10. Does the given graph show a function? Explain your answer.

yes, it passes the vertical line test; meaning there is exactly one corresponding y-value for every x-value.



Does the given graph have an inverse? Explain your answer.

yes it has an inverse because all functions have inverses. It does not have an inverse function because it is not 1 to 1

11. Use the given graph of f to sketch the graph of f^{-1}.