MHF4U
Quiz Combining Functions

18

Name SOLUTIONS
Date Nov 23, 2015

1. Complete the following table [KU 5]

x	$f(x)$	$g(x)$	$f(x)+g(x)$	$\left(\frac{f}{g}\right)(x)$	$(f\circ g)(x)$	$(g\circ f)(x)$	$(f\circ f)(x)$
-2	0	1	1	0	2	0	1
0	1	0	1	DNE	1	-1	2
1	2	-1	1	-2	DNE	DNE	DNE

2. Given the functions [A 7]

$f(x)=\frac{x}{x+1}$ and $g(x)=\sqrt{x-3}$

Find

a) $(f-g)(4) = f(4)-g(4) = \frac{4}{5}-1 = -\frac{1}{5}$

b) $(fg)(0) = f(0)g(0) = 0\cdot\sqrt{-3}$ DNE

c) $(f\circ g)(4) = f(g(4)) = f(1) = \frac{1}{2}$

d) $(f\circ f)(-2) = f(f(-2)) = f\left(\frac{-2}{-1}\right) = f(2) = \frac{2}{3}$

e) $(g\circ g)(28) = g(g(28)) = g(5) = \sqrt{2}$

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

g) $(g\circ f)(x) = g(f(x)) = g\left(\frac{x}{x+1}\right) = \sqrt{\frac{x}{x+1}-3} = \sqrt{\frac{-3-2x}{x+1}}$

3. Given the following functions [T 3]

$f(x) = x^2 + 3$ and $g(x) = \sqrt{x-1}$

Find the domain and the range of $(f \circ g)(x)$.

$[1,\infty) \xrightarrow{g(x)=\sqrt{x-1}} [0,\infty) \xrightarrow{f(x)=x^2+3} [3,\infty)$

$D_{fog} = [1,\infty)$

$R_{fog} = [3,\infty)$

4. Find two functions f and g such that $h(x) = (f \circ g)(x)$ where $h(x) = x^2 + \frac{1}{x+2}$. [T 3]

$h(x) = (x+2-2)^2 + \frac{1}{x+2}$

$g(x) = x+2$

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

MHF4U
Quiz Composition of Functions

Name .....
Nov 22, 2016

1. Given are the functions $f(x)=x^2-1$, $g(x)=\sqrt{x+2}$, and $h(x)=\frac{x+1}{x-3}$. Find: [A 6]

a) $(f\circ g)(2) = f(g(2)) = f(2) = 3$

b) $(h\circ f)(3) = h(f(3)) = h(8) = \frac{9}{5}$

c) $(h\circ f\circ g)(-1) = h(f(g(-1))) = h(f(1)) = h(0) = -\frac{1}{3}$

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

e) domain of $g+h$ $\quad D_g = [-2,\infty)$; $D_h = \mathbb{R}\setminus\{3\}$

$D_{g+h} = D_g \cap D_h = [-2,3)\cup(3,\infty)$

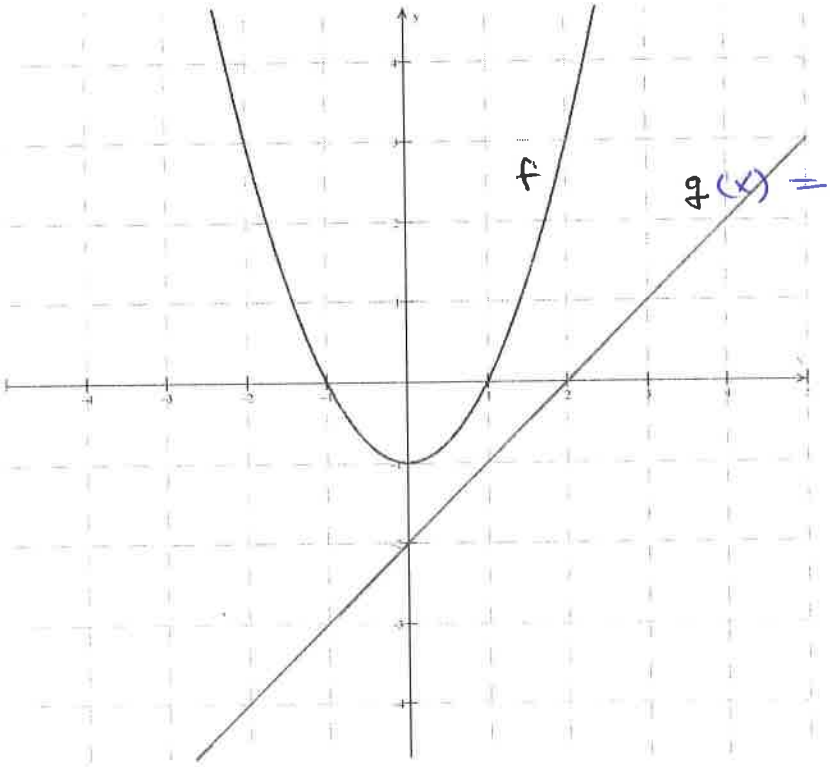
f) domain and range of $f\circ g$

$$[-2,\infty) \xrightarrow{g(x)=\sqrt{x+2}} [0,\infty) \xrightarrow{f(x)=x^2-1} [-1,\infty)$$

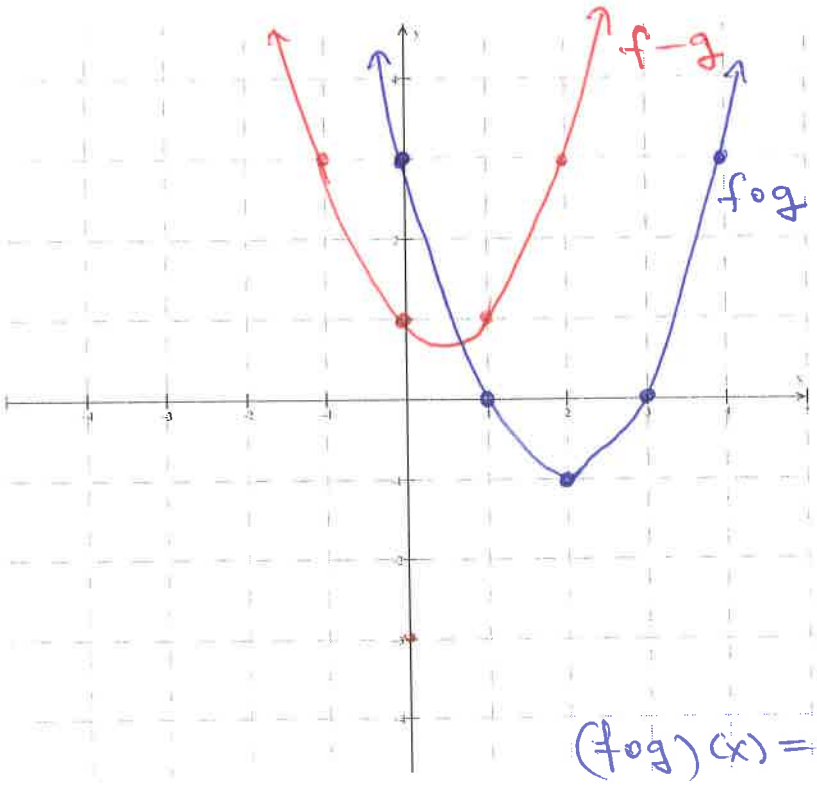
$D_{f\circ g} = [-2,\infty)$

$R_{f\circ g} = [-1,\infty)$

2. The functions f and g are given below graphically. [T 4]



Sketch on the grid provided below the graphs of $f-g$ and $f \circ g$. $= f(x-2)$



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

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