Spiral Review:

Find the domain of the function.

1. $f(x) = x^2$

D: $(-\infty, \infty)$

2. $g(x) = \frac{1}{x-4}$ → $x-4=0$, $x=4$

D: all real #s except 4

$\frac{1}{(x-4)}$

3. $h(x) = \sqrt{5-x}$ → $5-x=0$, $-x=-5$, $x=5$

$x \le 5$

$(-\infty, 5]$

$\frac{\sqrt{x+2}}{(x+2)}$

4. $j(x) = \frac{\sqrt{x+2}}{x+2}$ → $x+2=0$, $x=-2$

$[-2, \infty)$

$x+2=0$

$x=-2$

all real # except -2

$(-2, \infty)$

p.50 1.5 Combinations of Functions

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

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

$$(fg)(x) = f(x) \bullet g(x)$$

$$(f/g)(x) = \frac{f(x)}{g(x)}$$

$f \circ g \rightarrow f(g(x))$

*plug g in f

$g \circ f \rightarrow g(f(x))$

*plug f in g

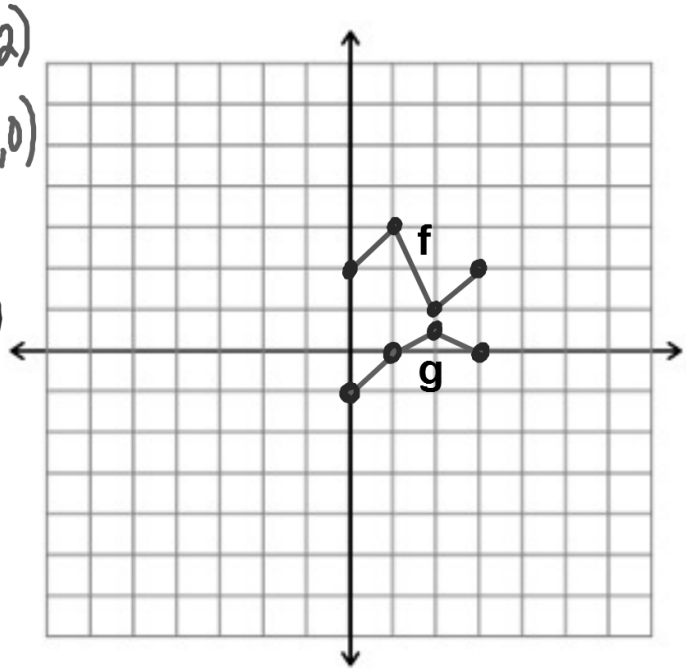
Example 1: Use the graph to sketch the graph of $h(x) = (f+g)(x)$.

$f(x) = (0,2)\ (1,3)\ (2,1)\ (3,2)$

$g(x) = (0,-1)\ (1,0)\ (2,\frac{1}{2})\ (3,0)$

(same, add y's)

$h(x) = (0,1)\ (1,3)\ (2,\frac{3}{2})\ (3,2)$



Example 2: (a) (f+g)(x), (b) (f-g)(x), (c) (fg)(x), (d) (f/g)(x). What is the domain of f/g?

a.) $f(x) = 2x - 5$, $g(x) = 1 - x$

ⓐ $(f+g)(x) = 2x-5+1-x$
$= \boxed{x-4}$

ⓑ $(f-g)(x) = 2x-5-(1-x)$
$= 2x-5-1+x$
$= \boxed{3x-6}$

ⓒ $(fg)(x) = (2x-5)(1-x)$
$= 2x-2x^2-5+5x$
$= \boxed{-2x^2+7x-5}$

ⓓ $(f/g)(x) = \frac{2x-5}{1-x}$
all real #s except 1

b.) $f(x) = 2x + 5$, $g(x) = x^2 - 9$

ⓐ $(f+g)(x) = 2x+5+x^2-9$
$= \boxed{x^2+2x-4}$

ⓑ $(f-g)(x) = 2x+5-(x^2-9)$
$= 2x+5-x^2+9$
$= \boxed{-x^2+2x+14}$

ⓒ $(fg)(x) = (2x+5)(x^2-9)$
$= 2x^3-18x+5x^2-45$
$= \boxed{2x^3+5x^2-18x-45}$

ⓓ $(f/g)(x) = \frac{2x+5}{x^2-9}$
all real #s except 3 and -3

Example 3: Find (a) f º g, (b) g º f, (c) (f º g)(0)

a.) $f(x) = 5x + 4$
$g(x) = x - 4$

ⓐ $f(g(x)) = 5(x-4)+4$
$= 5x - 20 + 4$
$= \boxed{5x-16}$

ⓑ $g(f(x)) = (5x+4) - 4$
$= \boxed{5x}$

ⓒ $f(g(0)) =$
$g(0) = 0-4$
$g(0) = -4$
$f(-4) = 5(-4)+4$
$= \boxed{-16}$

b.) $f(x) = \frac{1}{3}x - 3$
$g(x) = 3x + 9$

ⓐ $f(g(x)) = \frac{1}{3}(3x+9) - 3$
$= x + 3 - 3$
$= \boxed{x}$

ⓑ $g(f(x)) = 3(\frac{1}{3}x - 3) + 9$
$= x - 9 + 9$
$= \boxed{x}$

ⓒ $f(g(0)) =$
$g(0) = 3(0)+9$
$= 9$
$f(9) = \frac{1}{3}(9) - 3$
$= \boxed{0}$

c.) $f(x) = \sqrt{x}$
$g(x) = x^2$

ⓐ $f(g(x)) = \sqrt{x^2}$
$= \boxed{x}$

ⓑ $g(f(x)) = (\sqrt{x})^2$
$= \boxed{x}$

ⓒ $f(g(0)) =$
$g(0) = 0^2$
$= 0$
$f(0) = \sqrt{0}$
$= \boxed{0}$

d.) $f(x) = \frac{1}{x}$
$g(x) = \frac{1}{2x}$

ⓐ $f(g(x)) = \frac{1}{\frac{1}{2x}} = \boxed{2x}$

ⓑ $g(f(x)) = \frac{1}{2(\frac{1}{x})} = \boxed{\frac{x}{2}}$

ⓒ $f(g(0)) =$ use ans. from (a)
$= 2 \cdot 0$
$= \boxed{0}$

$g(0) = \frac{1}{2 \cdot 0}$
$=$ und.

do other way!

Example 4: Determine the domains of (a) f, (b) g, (c) f º g

a.) $f(x) = 5x + 4$
$g(x) = x - 4$

ⓐ $(-\infty, \infty)$

ⓑ $(-\infty, \infty)$

ⓒ $(-\infty, \infty)$

$f(g(x)) = 5(x-4)+4$
$= 5x-20+4$
$= 5x-16$

b.) $f(x) = \frac{1}{3}x - 3$
$g(x) = 3x + 9$

ⓐ $(-\infty, \infty)$

ⓑ $(-\infty, \infty)$

ⓒ $(-\infty, \infty)$

c.) $f(x) = \sqrt{x}$
$g(x) = x^2$

ⓐ $[0, \infty)$

ⓑ $(-\infty, \infty)$

ⓒ $[0, \infty)$

d.) $f(x) = \frac{1}{x}$
$g(x) = \frac{1}{2x}$

ⓐ all real #s except 0

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Turn-in: p.56 (15, 20, 48, 54)

HW: p.56 (7-21, 41-53 odds)

****41,43 only a and b**

Skip #9