

PC-Lesson 1.4--Combinations of Functions

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

Find:

$$(a) (f + g)(x) \rightarrow f(x) + g(x) = x^2 + 2x - 4$$

$$(b) (f - g)(x) \rightarrow f(x) - g(x) = -x^2 + 2x - 2$$

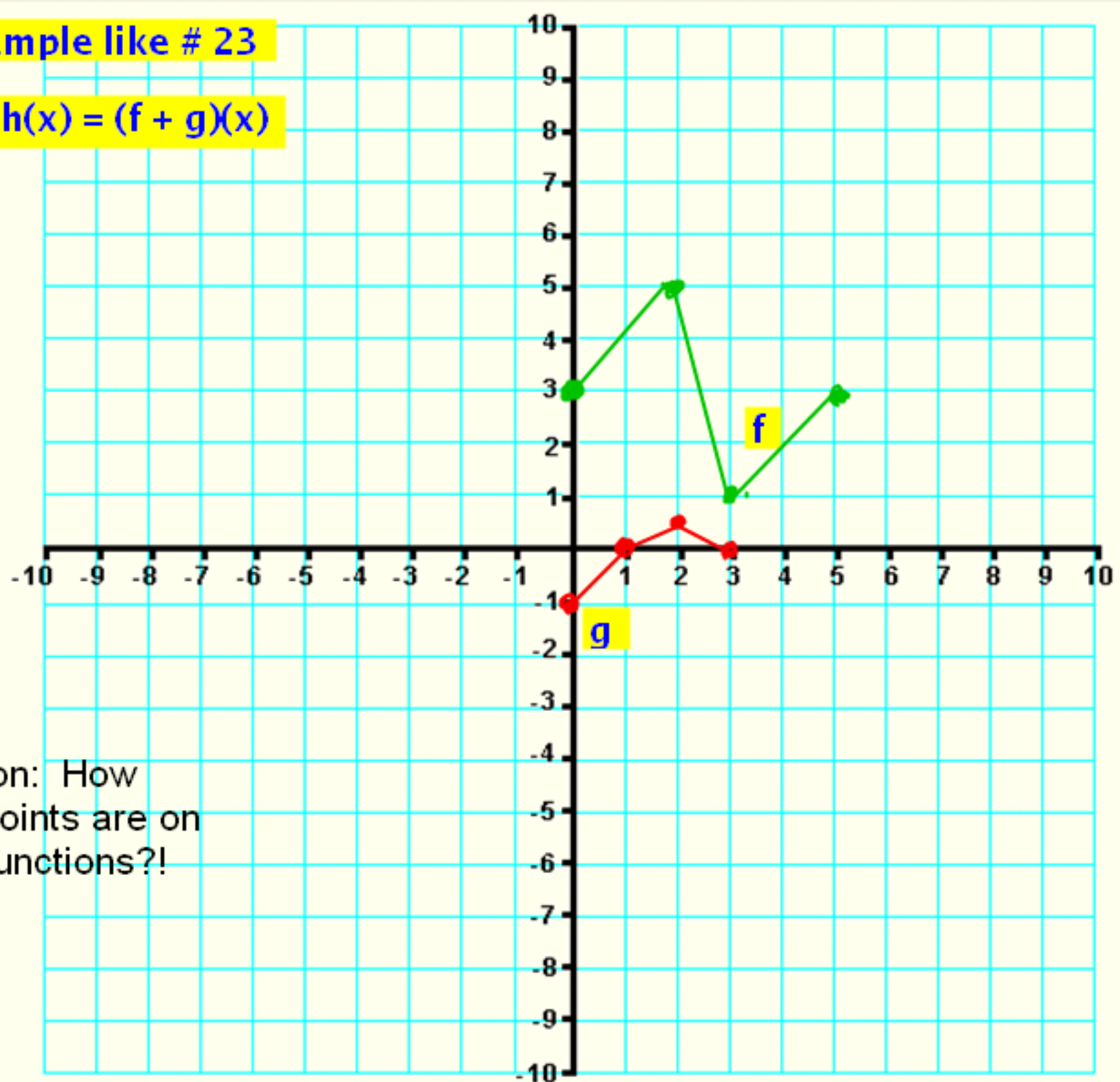
$$(c) (f \cdot g)(x) \rightarrow f(x) \cdot g(x) = 2x^3 - 3x^2 - 2x + 3$$

$$(d) \frac{f(x)}{g(x)} \rightarrow \frac{f(x)}{g(x)} = \frac{2x-3}{x^2-1}; x \neq \pm 1$$

$$(e) (f \circ g)(x) \qquad (f) (g \circ f)(x) \qquad (g) (f \circ g)(3)$$

1.4 example like # 23

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



Question: How many points are on these functions?!

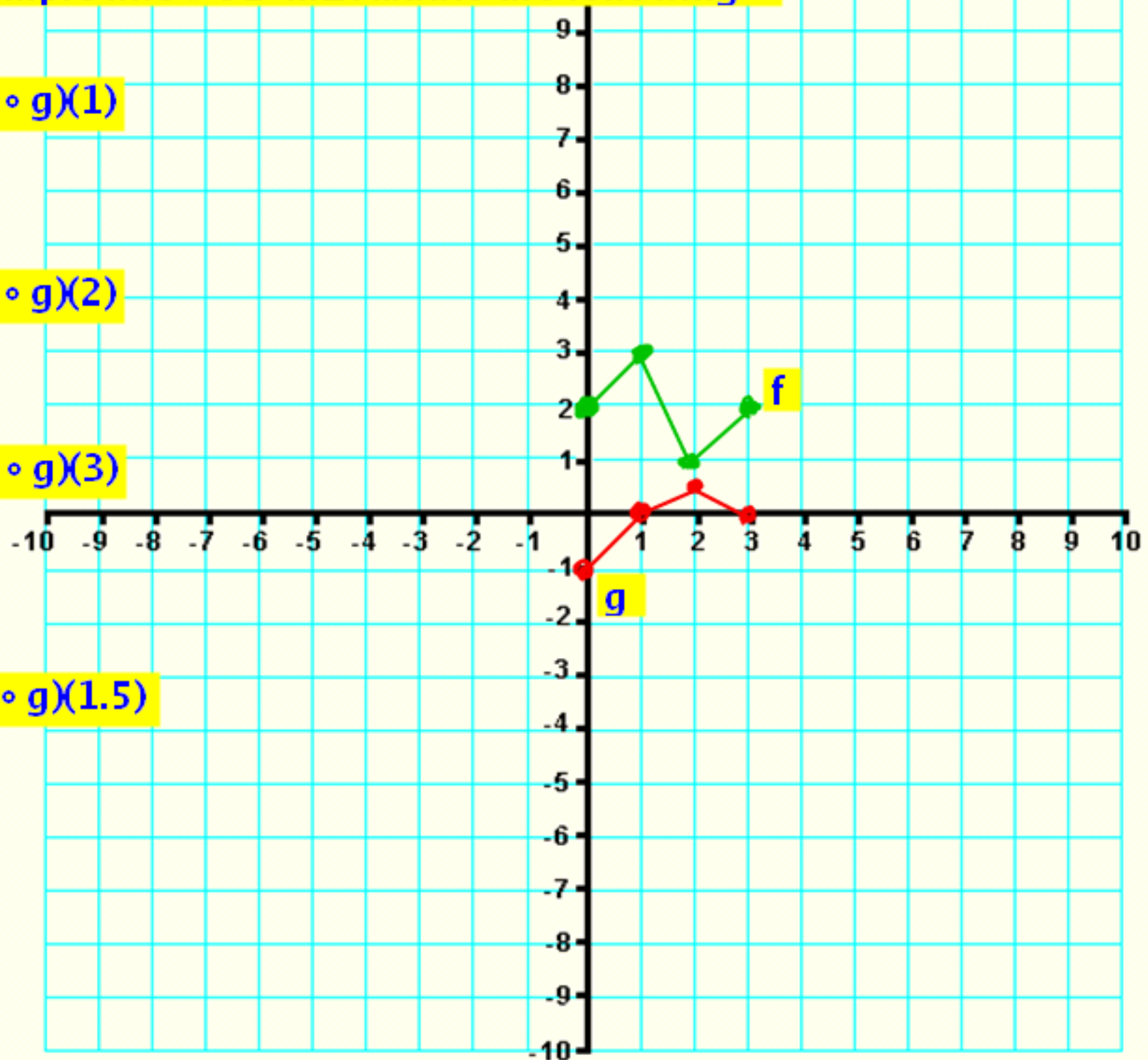
1.4 example like # 51+...Evaluate the following

Find $(f \circ g)(1)$

Find $(f \circ g)(2)$

Find $(f \circ g)(3)$

Find $(f \circ g)(1.5)$



When combining functions one must be careful with the new domain!

$$\text{Let } f(x) = \sqrt{x} \text{ and } g(x) = \sqrt{4-x^2}$$

Find $(f/g)(x)$ and $(g/f)(x)$ and tell the domain of each

$$(f/g)(x) = \frac{\sqrt{x}}{\sqrt{4-x^2}} ; \quad D: [0,2)$$

$$(g/f)(x) = \frac{\sqrt{4-x^2}}{\sqrt{x}} ; \quad D: (0,2]$$

NOTE: $f(x)$ can't = 0, so don't include 0 in the domain.

Express $h(x) = (3x-5)^3$ as a composition of 2 functions...

Look for an "inner" and an "outer" function.

If $g(x) = 3x - 5$ and $f(x) = x^3$ then...

$$h(x) = [f \circ g](x) = (3x-5)^3 \\ = f[g(x)]$$

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

$$g(x)=x-2; f(x) = \frac{1}{x^2} \rightarrow \rightarrow h(x)=[f \circ g](x)$$

or...

Let $g(x)=(x-2)^2$ and $f(x)=1/x$

Then $h(x)=1/g(x) = [f \circ g](x)$

Soooo, there is more than one possible answer to some of these type questions!

Ex5: Let $f(x)=\sqrt{x}$, $x \geq 0$ and $g(x)=x-1$, $x \geq 1$

Find

(a) $[f \circ g](x) = \sqrt{x-1}$, $x \geq 1$

(b) $[f \circ g](2) = \sqrt{1} = 1$

(c) $[f \circ g](0)$ not defined b/c 0 is not in the D of $f \circ g$

Also note... $f \circ g \neq g \circ f$

(i.e., composition of functions is NOT commutative!)