

## The Algebra of Functions

### Domain (yet again)

Can think of domain as set of all #'s you can plug into a function (i.e. all possible inputs).

#### Ex 1.

Find the domain of  $f(x) = \frac{1}{x-2}$

#### Ex 2.

Find the domain of  $g(x) = 5x - 2$

### The Algebra of Functions

We can add, subtract, multiply, or divide functions.

Sum	$(f + g)(x) =$
Difference	$(f - g)(x) =$
Product	$(fg)(x) =$
Quotient	$\left(\frac{f}{g}\right)(x) =$

#### Ex 3.

Let  $f(x) = x^2 - 2x$  and  $g(x) = x + 3$ .

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

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

$$\left(\frac{f}{g}\right)(x) =$$

$$\left(\frac{f}{g}\right)(7) =$$

$$(fg)(-4) =$$

**Ex 4.**

Suppose  $f(x) = \frac{2}{x}$  and  $g(x) = \frac{4}{x+1}$ .

Find  $f - g$ .

What's the domain of  $f$ ?

What's the domain of  $g$ ?

What's the domain of  $f - g$ ?

**Note:** The domains of  $f + g$ ,  $f - g$ , and  $fg$  are all the #'s that can be plugged into both  $f(x)$  and  $g(x)$ . For  $\frac{f}{g}$  it's the same, though you also have to take out any #'s that make  $g(x) = 0$ .

**Ex 5.**

Suppose  $f(x) = x^2$  and  $g(x) = x + 1$ .

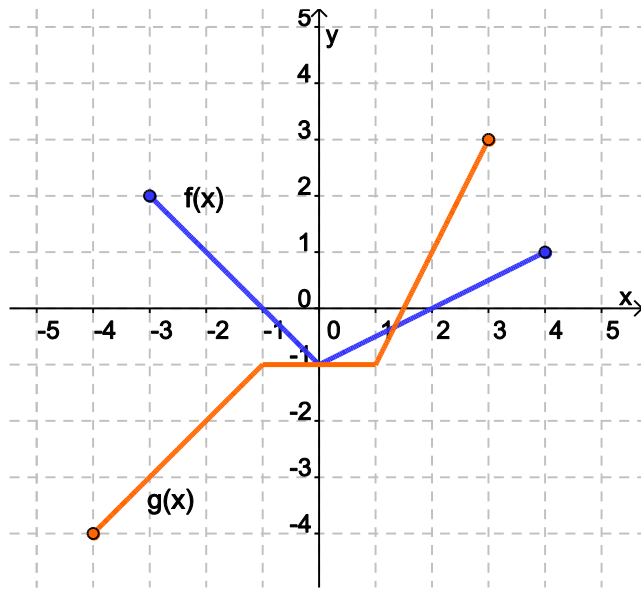
Find  $fg$  and its domain.

Now find  $\frac{f}{g}$  and its domain.

**Ex 6.**

Let  $f(x) = \frac{2x}{x-2}$  and  $g(x) = \frac{1}{3-x}$ . Find the domain of  $fg$ .

Ex 7.



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

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

$$(fg)(-3) =$$

$$\left(\frac{g}{f}\right)(0) =$$

What's the domain of  $f(x)$ ?

What's the domain of  $g(x)$ ?

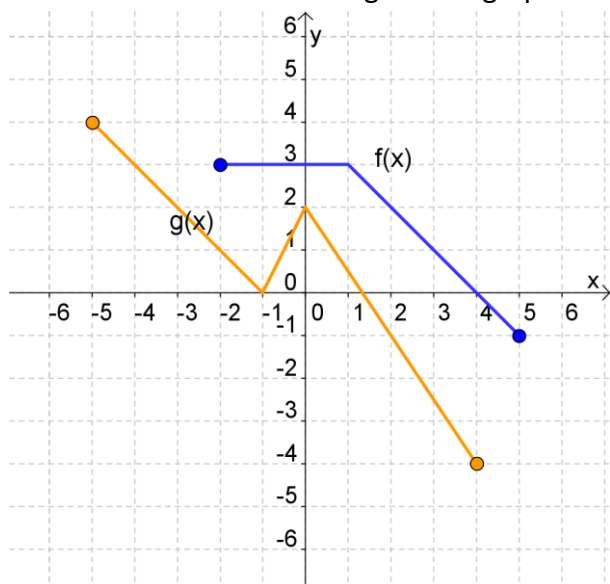
What's the domain of  $f + g$ ?

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**Practice**


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- Find the domain of  $f(x) = \frac{x}{3-x}$
- Find the domain of  $f(x) = 7x + 4$
- Suppose  $f(x) = 7x + 4$  and  $g(x) = \frac{2}{x-6}$ . Find  $(f + g)(x)$ ,  $(f + g)(8)$ , and the domain of  $f + g$ .
- Suppose  $f(x) = x^2 + 4x$  and  $g(x) = 2 - x$ . Find the following.
  - $(fg)(-3)$
  - $\left(\frac{f}{g}\right)(0)$
  - $(f - g)(x)$
  - $(f - g)(6)$
  - The domain of  $f + g$ .
  - The domain of  $\frac{f}{g}$
- Let  $f(x) = \frac{9x}{x-4}$  and  $g(x) = \frac{7}{x+8}$ . Find the domain of  $fg$ .
- Find each of the following for the graph below.



- $(f + g)(2)$
- $(g - f)(-2)$
- $(fg)(-3)$
- $\left(\frac{g}{f}\right)(0)$
- The domain of  $f(x)$ .
- The domain of  $g(x)$ .
- The domain of  $f + g$ .

Here's something my mom e-mailed me:

7H15 M355AG3 53RV35 70 PROV3 HOW OUR MIND5 C4N DO 4M4ZING 7HINGS! 1N 7H3  
 B3G1NN1ING 17 WA5 H4RD BU7 NOW, ON 7H1S LIN3, YOUR M1ND 1S R34DIN 17 4U7OM471C4LLY,  
 W17H OU7 3V3N 7HINKING 4BOU7 17.