

For the given functions  $f$  and  $g$ , find the following and state the domain of each result.

$$f(x) = 5x - 1; g(x) = 8x + 9$$

(a)  $(f - g)(x) = -3x - 10$

What is the domain of  $f - g$ ?

- $\{x \mid x \neq \frac{1}{5}\}$ 
  $\{x \mid x > \frac{1}{5}\}$   
  $\{x \mid x \geq 0\}$ 
  $\{x \mid x \text{ is any real number}\}$

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

$$\underbrace{\text{Domain of } \frac{f}{g}}_{D\left(\frac{f}{g}\right)} = \{x \mid x \in D(f) \text{ and } x \in D(g) \text{ and } g(x) \neq 0\} = D\left(\frac{f}{g}\right)$$

Domain's the same as  $D(f - g)$  only throw out  $x$ -values that make  $g(x) = 0$ .

$$g(x) = 0$$

$$8x + 9 = 0$$

$$8x = -9$$

$$x = -\frac{9}{8} \text{ to be thrown out.}$$

→ can't have 0 in denominator.

$$D\left(\frac{f}{g}\right) = \left\{x \mid x \neq -\frac{9}{8}\right\}$$

(Since  $D(f) = \{x \mid x \text{ is real}\}$  No restriction  
and  $D(g) = \{x \mid x \text{ is real}\}$  No restriction)

only worry was division by zero in

$$\left(\frac{f}{g}\right)(x) = \frac{5x-1}{8x+9}$$

→ only worry is  $8x+9=0$ .