

# Topic: function operations.

today: +, -, ·, ÷

to add functions  $f(x)$  and  $g(x)$ :  
just add the 2 outputs for  
each input

domain of  $f(x)+g(x)$ : common  
domain of  $f$  and  $g$

$$\begin{array}{ll} \text{notation: } f(x)+g(x) & (f+g)(x) \\ f(x)-g(x) & (f-g)(x) \\ f(x) \cdot g(x) & (f \cdot g)(x) \\ \frac{f(x)}{g(x)} & \left(\frac{f}{g}\right)(x) \end{array}$$

Example:  $f(x) = x+2$   $g(x) = x^2-1$

(a)  $(f+g)(x) = x+2+x^2-1$   
 $= x^2+x+1$  dom:  $\mathbb{R}$

(b)  $(f-g)(x) = x+2-(x^2-1)$   
 $= x+2-x^2+1$   
 $= -x^2+x+3$  dom:  $\mathbb{R}$

(c)  $(f \cdot g)(x) = (x+2) \cdot (x^2-1)$   
 $= x^3-x+2x^2-2$   
 $= x^3+2x^2-x-2$  dom:  $\mathbb{R}$

(d)  $\left(\frac{f}{g}\right)(x) = \frac{x+2}{x^2-1}$  domain:  $x \neq \pm 1$   
 $(x+1)(x-1)$   
 $x \neq -1 \quad x \neq 1$

$$\#14 \text{ p. 430} \quad f(x) = 2-x \quad g(x) = \frac{1}{x}$$

$$(f-g)(x) = 2-x - \frac{1}{x} \quad \text{dom: } x \neq 0$$

$$= \frac{2x}{x} - \frac{x^2}{x} - \frac{1}{x} \quad \leftarrow \text{OK}$$

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

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

$$= \frac{-(x-1)^2}{x} \quad \leftarrow \text{OK} \quad \text{dom: } x \neq 0$$

$$\#16 (f \cdot g)(x) = (2-x) \cdot \frac{1}{x}$$

$$= \frac{2-x}{x} \quad \leftarrow \text{OK}$$

$$= \frac{2}{x} - 1 \quad \leftarrow \text{OK} \quad \text{dom: } x \neq 0$$