

Section 1.4: Building functions from functions

- Perform the following operations on the given functions:

- $f(x) = 2x - 3$ $g(x) = 3x - 1$

- $f+g = 2x-3 + 3x-1 = 5x-4$

- $f-g = 2x-3 - (3x-1) = -x-2$

- $f \cdot g = (2x-3)(3x-1) = 6x^2 - 11x + 3$

- $f/g = \frac{2x-3}{3x-1} \quad \left(x \neq \frac{1}{3} \right) \quad \left(-\infty, \frac{1}{3} \right) \cup \left(\frac{1}{3}, \infty \right)$

$$\frac{2x-3}{3x-1}$$

$$\frac{2x-3}{3x-1}$$

$$\frac{2x-3}{3x-1}$$

$$\frac{2x}{3x-1} - \frac{3}{3x-1}$$

Rational $\rightarrow$ Rest. (Not allowed)
D $\neq 0$
D = 0

$$3x-1=0$$

$$+1 \quad +1$$

$$\frac{3x+1}{3 \quad 3}$$

$$x \neq \frac{1}{3}$$

$$V.A \quad x = \frac{1}{3}$$

$$H.A \quad y = \frac{2}{3}$$

we cannot split the denominator

$$\frac{2+8}{1+9} = \frac{10}{10} = 1$$

$$\frac{2}{1} + \frac{8}{9} =$$

Composition of functions

The **composition f of g**, denoted $f \circ g$, is defined by the rule

$$(f \circ g)(x) = f(g(x)).$$

plll

The function g is applied first and then f . This is the reverse of the order in which we read the symbols.

Example: $f(x) = 2x - 3$ $g(x) = \sqrt{x+1}$

$f \circ g(x) = f(g(x))$
composition of function

start with the inside

Given

$$f(x) = 2x - 3$$

$$g(x) = \sqrt{x+1}$$

Question Find

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

step 1 • $g(3) = \sqrt{3+1} = \sqrt{4} = 2$

step 2 • $f(2) = 2(2) - 3 = 4 - 3 = 1$

$$f \circ g(3) = 1$$

one step: $f \circ g(3) = f(g(3)) = f(\sqrt{3+1})$
 $= f(\sqrt{4})$
 $= f(2)$
 $= 2(2) - 3$
 $= 1$