

Section 1.4: Building functions from functions

- Perform the following operations on the given functions:

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

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

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

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

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

Composition of functions

$$f \circ g$$

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

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

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

Calculate the ^{value} function f of g for $x=3$.

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

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

start with g : $g(3) = \sqrt{3+1} = \sqrt{4} = 2$.

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

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

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

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

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

$$g \circ f(3) = 2$$

$$(g \circ f)(7) = g(f(7)) = g(2(7) - 3)$$

$$= g(11) = \sqrt{11+1} = \sqrt{12} = 2\sqrt{3}$$

$$(g \circ f)(-1) = g(f(-1)) = g(2(-1) - 3) = g(-5)$$

$$= \sqrt{-5+1} = \sqrt{-4} \quad \text{No real solution}$$

$$= \pm 2i$$

