

TOPIC: COMPOSITION OF FUNCTIONS

Function Composition

◆ Function composition is like evaluating, but you replace the inside variable of a function with **ANOTHER** _____.

EVALUATING a Function	COMPOSING a Function
$f(x) = x^2 + 3x - 10$	$f(x) = x^2 + 3x - 10$
$f(7) = ()^2 + 3() - 10$	$g(x) = x - 2$
=	$f(g(x)) = ()^2 + 3() - 10$
Result is a [NUMBER FUNCTION]	=
	Result is a [NUMBER FUNCTION]

Note: $f(g(x))$ is often written as _____. First letter = outside function, second letter = inside function

EXAMPLE: Given the functions $f(x) = x + 4$ and $g(x) = x^2 - 3$, find the following composite functions (fully simplify your answer).

(A) $f(g(x)) =$

(B) $g(f(x)) =$

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PRACTICE

Given the functions $f(x) = \sqrt{x+4}$ and $g(x) = (x-2)^2 - 4$, (A) find $(f \circ g)(x)$ and (B) $(g \circ f)(x)$.

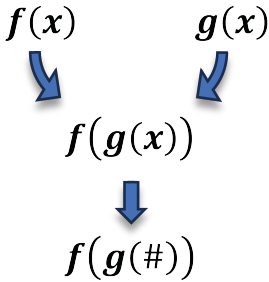
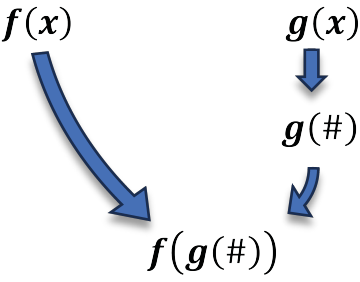
PRACTICE

Given the functions $f(x) = \frac{1}{x^2-2}$ and $g(x) = \sqrt{x+2}$, (A) find $(f \circ g)(x)$ and (B) $(g \circ f)(x)$.

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Evaluating Composed Functions

◆ You may have to compose functions and **then** _____ at a specific value, $f(g(\#))$. Two common methods:

Method 1: Compose → Evaluate <i>Use when first asked to find $f(g(x))$</i>	Method 2: Evaluate inside → Evaluate outside
	
<p>EXAMPLE: For $f(x) = x^2$ and $g(x) = x - 1$, find $f(g(x))$ and then evaluate $f(g(3))$</p>	<p>EXAMPLE: For $f(x) = x^2$ and $g(x) = x - 1$, evaluate $f(g(3))$</p>

PRACTICE

Given the functions $f(x) = x + 3$ and $g(x) = x^2$, (A) find $(f \circ g)(2)$ and (B) $(g \circ f)(2)$.

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Domain of Composite Functions

◆ To find the **domain** of a composite function, follow these steps to exclude x -values from $f \circ g(x)$:

- 1) Find any x -values not defined for _____
- 2) Find any x -values that make $g(x)$ not defined for _____

EXAMPLE: Given the functions $f(x) = \frac{1}{x-2}$ and $g(x) = \sqrt{x}$, determine the domain of $f(g(x))$.

PRACTICE

Given the functions $f(x) = x^2$ and $g(x) = \sqrt{x-8}$, find $(f \circ g)(x)$ and determine its domain.