Combinations of Functions

Warm-up

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

1. Find $f(x) + g(x)$

2. Find $f(x) - g(x)$

3. Find $f(x) \cdot g(x)$

4. Find $\frac{f(x)}{g(x)}$

Sum, Difference, Product, and Quotient of Functions

1. Sum: $(f + g)(x)$ = _____

2. Difference: $(f - x)(x)$ = _____

3. Product: $(fg)(x)$ = _____

4. Quotient: $\left(\frac{f}{g}\right)(x)$ = _____

Practice Problem 1

Given $f(x) = 2x + 1$ and $g(x) = x^2 + 2x - 1$

a) Find $(f + g)(x)$ Evaluate at $x = 2$

b) Find $(f - g)(x)$ Evaluate at $x = 2$

Practice Problem 2

Given $f(x) = x^2$ and $g(x) = x - 3$. Find $(fg)(x)$ and then evaluate the product at $x = 4$.

Combinations of Functions

Practice Problem 3

Given $f(x)=\sqrt{x}$ and $g(x)=\sqrt{4-x^2}$. Find $\left(\frac{f}{g}\right)(x)$.

Compositions of Functions

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

Example 1

Given $f(x)=\sqrt{x}$ and $g(x)=x-1$, find

a) $(f \circ g)(x)$

b) $(f \circ g)(2)$

c) $(f \circ g)(0)$

Practice Problem 4

Given $f(x)=x^2$ and $g(x)=x-1$, find

a) $(f \circ g)$

b) $(g \circ f)$

c) $(f \circ g)(0)$

Practice Problem 5

Given $f(x)=x+2$ and $g(x)=4-x^2$, evaluate when x = 0 and 1:

a) $(f \circ g)(x)$

b) $(g \circ f)(x)$

Combinations of Functions

Example 2

Find the domain of $f \circ g$ for the functions $f(x) = x^2 - 9$ and $g(x) = \sqrt{9 - x^2}$

Practice Problem 6

Given $f(x) = \sqrt{x + 4}$ and $g(x) = x^2$, determine the domains of:

a) f b) g c) $f \circ g$

Example 3

Write the function $h(x) = \dfrac{1}{(x-2)^2}$ as a composition: $f(g(x))$

Practice Problem 7

Write the function $h(x) = \dfrac{1}{x+2}$ as a composition: $f(g(x))$