

Use these functions:

$$g(x) = x - 3 \quad h(x) = x^2 + 2x - 15$$

Perform this function operation. Simplify as much as possible.
Find the domain of the resulting function.

$$\left(\frac{h}{g}\right)(x) = \frac{x^2 + 2x - 15}{x - 3}$$

To simplify a quotient you must factor both the numerator and denominator. This allows you to cancel common factors.

$$= \frac{(x+5)(\cancel{x-3})}{(\cancel{x-3})} = x+5$$

Domain: $x \neq 3$

When dividing two functions, the resulting domain is the union of the domains of the original functions.....

AND ALSO

$x \neq$ zeros of the denominator.

$$g(x) = x^2 + x - 12$$

$$f(x) = x^2 - 9$$

Simplify and state the domain.

$$\left(\frac{g}{f}\right)(x) = \frac{x^2 + x - 12}{x^2 - 9}$$

$$= \frac{(x+4)(\cancel{x-3})}{(x+3)(\cancel{x-3})}$$

$x^2 - 9$ is the difference of perfect squares, thus, the factors are $(x \pm 3)$

$$= \frac{x+4}{x+3}$$

Domain: $x \neq \pm 3$

You can now finish Hwk #5.

Practice Sheet Sec 7-6: Function Operations.

Due tomorrow

given $5x + 4y = 12$ and $y = 2x - 3$

Solve for x.

use substitution

$$5x + 4(2x - 3) = 12$$

$$5x + 8x - 12 = 12$$

$$13x = 24 \quad x = \frac{24}{13}$$

Composite Materials

A "composite" is when two or more different materials are combined together.

Composite Functions: When two functions are combined into one function.

$f(g(x))$ is read as "f of g of x"

You are substituting the function $g(x)$ into the function $f(x)$.

$$f(x) = 3x - 7$$

$$g(x) = 4x + 1$$

substitution turns these two functions into one composite function:

$$f(g(x)) \longrightarrow = 3(4x + 1) - 7 = 12x + 3 - 7 = 12x - 4$$

Given these two functions: $f(x) = 3x^2 - 7$ and $g(x) = 2x + 4$

1. Find $f(3)$

Substitute 3 into the function $f(x)$.

$$\begin{aligned} f(3) &= 3(3)^2 - 7 \\ &= 3(9) - 7 \\ &= 27 - 7 \\ &= 20 \end{aligned}$$

2. Find $g(3)$

Substitute 3 into the function $g(x)$.

$$\begin{aligned} g(3) &= 2(3) + 4 \\ &= 6 + 4 \\ &= 10 \end{aligned}$$

Given these two functions: $f(x) = 3x^2 - 7$ and $g(x) = 2x + 4$

a. Find $f(g(3))$

Step 1: Find $g(3)$

from previous page $g(3) = 10$

Step 2: Take the result of Step 1 and substitute it into the function $f(x)$.

$$\begin{aligned} f(10) &= 3(10)^2 - 7 \\ &= 3(100) - 7 \\ &= 300 - 7 \end{aligned}$$

$$f(g(3)) = 293$$

b. find $g(f(3))$

Step 1: Find $f(3)$ from previous page

$$f(3) = 20$$

Step 2: Take the result of Step 1 and substitute it into the function $g(x)$.

$$\begin{aligned} g(20) &= 2(20) + 4 \\ &= 40 + 4 \end{aligned}$$

$$g(f(3)) = 44$$

Given this function: $g(w) = 2w^2 - 7w$

Step 1: Find $g(2)$

Find $g(g(2))$.

Step 2: Take the result of Step 1 and substitute it back into $g(x)$.

1st $g(2) = 2(2)^2 - 7(2) = 2(4) - 7(2) = 8 - 14 = -6$

2nd now do $g(-6) = 2(-6)^2 - 7(-6)$

$$\begin{aligned} &= 2(36) - 7(-6) \\ &= 72 + 42 \end{aligned}$$

$$g(g(2)) = 114$$