



James Madison
HIGH SCHOOL

Combinations of Functions: Composite Functions

The composition of the functions f and g is

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

“ f composed by g of x equals f of g of x ”



$$\sqrt{x}$$

$$g(x) = x - 1$$

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

$$\begin{aligned}(f \circ g)(x) &= f(g(x)) = \sqrt{x-1} \\ \text{when } x=2 &= \sqrt{2-1} = 1\end{aligned}$$

Ex. #2 $f(x) = x + 2$ and $g(x) = 4 - x^2$

$$\begin{aligned}(f \circ g)(x) &= f(g(x)) = (4 - x^2) + 2 \\ &= -x^2 + 6\end{aligned}$$

$$\begin{aligned}(g \circ f)(x) &= g(f(x)) = 4 - (x + 2)^2 = 4 - (x^2 + 4x + 4) \\ &= -x^2 - 4x\end{aligned}$$



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Express $h(x) = \frac{1}{(x-2)^2}$ as a composition
of two functions f and g .

$$f(x) = \frac{1}{x^2}$$

$$g(x) = x - 2$$

Find the sum, difference, and quotient of two functions.

$$f(x) = 2x + 1 \quad g(x) = x^2 + 2x - 1$$

$$(f + g)(x) = 2x + 1 + x^2 + 2x - 1 = x^2 + 4x$$

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

$$\left(\frac{f}{g}\right)(x) = \frac{2x + 1}{x^2 + 2x - 1}$$