FUNCTIONS

Complete the following problems to reinforce your understanding of the concept covered in this module.

Problem 1:

Determine the roots of the function $f(x) = x^2 + x - 12$

Problem 2:

Given the functions $f(x) = 12x^2$ and $g(x) = 3x^3 + x^2 - 2$ determine $(g \circ f)$

Problem 3:

Given the functions $f(x) = x^3 - 2x + 1$ and $g(x) = x^2$ determine $(f \circ g)$

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Solution 1:

A root is simply a number for which the function results in zero. In other words where:

$$f(x) = 0$$

Setting the function against zero, we get:

$$x^2 + x - 12 = 0$$

Factoring:

$$(x-3)(x+4) = 0$$

When $x = 3 \, and \, x = -4$ the function will result in zero. Therefore, the roots of the function are located at (3,0) and (-4,0)

Solution 2:

Recall that the composition of *g(x)* and *f(x)* is written as:

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

Therefore, given $f(x) = 12x^2$ and $g(x) = 3x^3 + x^2 - 2$, plug f(x) in to the function g(x) such that:

$$g(12x^2) = 3(12x^2)^3 + (12x^2)^2 - 2$$

$$3\left[(12x^2)(12x^2)(12x^2)\right] + \left[(12x^2)(12x^2)\right] - 2$$

$$5184x^8 + 144x^4 - 2$$

Therefore:

$$\left(g \circ f\right) = 2592x^8 + 72x^4 - 2$$

Solution 3:

Recall that the composition of *f(x)* and *g(x)* is written as:

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

Therefore, given $f\left(x\right) = x^3 - 2x + 1$ and $g\left(x\right) = x^2$, plug g(x) in to the function f(x) such that:

$$f\left(x^2\right) = \left(x^2\right)^3 + \left(x^2\right) + 1$$
$$\left(x^6 + x^2 + 1\right)$$

Therefore:

$$\left(f \circ g\right) = x^6 + x^2 + 1$$