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Ex: 3 Given: $f(x) = x^2$ & $g(x) = x - 3$

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

$$(f \cdot g)(x) = (x^2)(x-3)$$
$$= x^3 - 3x^2$$

Ex: 4 Given: $f(x) = \sqrt{x}$ $g(x) = \sqrt{4-x^2}$

Find $(f/g)(x) = \dfrac{\sqrt{x}}{\sqrt{4-x^2}}$, $x \neq \pm 2$

$4 - x^2 = 0$
$\sqrt{4} = \sqrt{x^2}$
$\pm 2 = x$

Composition of Functions

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

Ex: 6 Given: $f(x) = x + 2$ $g(x) = 4 - x^2$

a) Find $(f \circ g)(x) = (4 - x^2) + 2$
$= 4 - x^2 + 2$
$(f \circ g)(x) = 6 - x^2$

b) Find $(g \circ f)(x) = 4 - (x+2)^2$
$= 4 - (x^2 + 4x + 4)$
$= 4 - x^2 - 4x - 4$
$= -x^2 - 4x$

c) Find $(g \circ g)(x) = 4 - (4 - x^2)^2$
$= 4 - (16 - 8x^2 + x^4)$
$= 4 - 16 + 8x^2 - x^4$
$(g \circ g)(x) = -x^4 + 8x^2 - 12$