

Let $f(x) = x^2 + 3x - 5$ and $g(x) = 2x - 1$. Find $(f \circ g)(x)$.

Solution:

$(f \circ g)(x) = f(g(x)) = f(2x - 1) = (2x - 1)^2 + 3(2x - 1) - 5$
 $= 4x^2 - 4x + 1 + 6x - 3 - 5 = 4x^2 + 2x - 7$

Problem 2:

Let $f(x) = x^2 + 2x + 1$ and $g(x) = x - 1$. Find $(f \circ g)(x)$ and $(g \circ f)(x)$.

Solution:

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