If $f(x) = x^2 + 3$ and $g(x) = 3x - 1$ then find the following

1g. $(f * g)(x)$

1h. $(f * g)(1)$

1i. $(g * f)(x)$

Solution:

1g. Composition $(f * g)(x)$ - means to multiply the two functions $f(x) * g(x)$.

$(f * g)(x) = f(x) * g(x) = (x^2 + 3)(3x - 1) = 3x^3 - x^2 + 9x - 3$

1h. Determine the value of the product features for a given value x, evaluate when $x = 1$

$(f * g)(1) = 3(1)^3 - 1(1)^2 + 9 \cdot 1 - 3 = 8$

$(f * g)(1) = 8$

1i. Since multiplication is commutative then both variants 1g and 1i will have the same answer.

$(g * f)(x) = (f * g)(x) = (3x - 1)(x^2 + 3) = 3x^3 - x^2 + 9x - 3$