

$$f(x) = 3x - 1 \quad g(x) = x^2 - x$$

① $(g \circ f)(x) = g(f(x))$

$$= (f(x))^2 - (f(x))$$

$$= (3x - 1)^2 - (3x - 1)$$

$$= 9x^2 - 3x - 3x + 1 - 3x + 1$$

$$= \boxed{9x^2 - 9x + 2}$$

② $(f \circ g)(x) = f(g(x))$

$$= 3(g(x)) - 1$$

$$= 3(x^2 - x) - 1$$

$$= \boxed{3x^2 - 3x - 1}$$

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

$$g(x) = \frac{1}{x+2}$$

① $(f+g)(x) = \frac{3x^2 + 2x - 1}{1} + \frac{1}{x+2}$

$$= \frac{(x+2)(3x^2 + 2x - 1) + 1}{x+2}$$

$$= \frac{3x^3 + 2x^2 - x + 6x^2 + 4x - 2 + 1}{x+2}$$

$$= \frac{3x^3 + 8x^2 + 3x - 1}{x+2}$$

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③ $(f \circ g)(x)$

$$= 3\left(\frac{1}{x+2}\right)^2 + \frac{2}{x+2} - 1$$

$$= 3\left[\left(\frac{1}{x+2}\right)\left(\frac{1}{x+2}\right)\right] + \frac{2}{x+2} - 1$$

$$= \frac{3}{x^2 + 4x + 4} + \frac{2}{x+2} - 1$$

$$= \frac{3}{(x+2)(x+2)} + \frac{2}{x+2} - 1$$

LCD: $(x+2)(x+2)$

$$= \frac{3 + 2(x+2) - [(x+2)(x+2)]}{(x+2)(x+2)}$$

$$= \frac{3 + 2x + 4 - [x^2 + 4x + 4]}{(x+2)(x+2)}$$

$$= \frac{3 + 2x + 4 - x^2 - 4x - 4}{(x+2)(x+2)}$$

$$= \frac{-x^2 - 2x + 3}{(x+2)(x+2)}$$

$$= -\frac{(x^2 + 2x - 3)}{(x+2)(x+2)}$$

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$$\frac{(x+2)(x+x)}{(x+2)(x+2)} = 1$$

$$\frac{(x+2)(\cancel{x+2})}{(\cancel{x+2})(x+2)} = (x+2)$$

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