

2. Dadas las funciones $f(x) = x^2 - 5x + 3$, $g(x) = \sqrt{x+1}$ y $h(x) = e^{2x-1}$; realizar las siguientes operaciones: $f - 3g + h$, $\frac{f}{h}$, $f \cdot g^2$, $f \circ g$, $g \circ f$, $f \circ g \circ h$.

Solución

$$(f - 3g + h)(x) = f(x) - 3g(x) + h(x) = x^2 - 5x + 3 - 3\sqrt{x+1} + e^{2x-1}$$

$$\left(\frac{f}{h}\right)(x) = \frac{f(x)}{h(x)} = \frac{x^2 - 5x + 3}{e^{2x-1}}$$

$$(f \cdot g^2)(x) = f(x)(g(x))^2 = (x^2 - 5x + 3)(\sqrt{x+1})^2 = (x^2 - 5x + 3)(x+1) = x^3 - 4x^2 - 2x + 3$$

$$(f \circ g)(x) = f(g(x)) = f(\sqrt{x+1}) = (\sqrt{x+1})^2 - 5\sqrt{x+1} + 3 = x+1 - 5\sqrt{x+1} + 3 = x - 5\sqrt{x+1} + 4$$

$$(g \circ f)(x) = g(f(x)) = g(x^2 - 5x + 3) = \sqrt{x^2 - 5x + 3 + 1} = \sqrt{x^2 - 5x + 4}$$

$$(f \circ g \circ h)(x) = (f \circ g)(h(x)) = f(g(h(x))) = f(g(e^{2x-1})) = f(\sqrt{e^{2x-1} + 1}) =$$

$$= (\sqrt{e^{2x-1} + 1})^2 - 5(\sqrt{e^{2x-1} + 1}) + 3 = e^{2x-1} + 1 - 5(\sqrt{e^{2x-1} + 1}) + 3 = e^{2x-1} - 5(\sqrt{e^{2x-1} + 1}) + 4$$