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Exercice 31 :

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

$$f'(x) = -x^3 + 9x^2 - 4x + 4$$

Exercice 32 :

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

$$f'(x) = 3(x+1)^2 + (3x-1)((1)(x+1) + (x+1)(1)) = 3(x+1)^2 + (3x-1)(2)(x+1) = (x+1)(3(x+1) + 2(3x-1)) \\ = (x+1)(3x+3+6x-2) = (x+1)(9x+1)$$

Exercice 33 :

$$f(x) = (\sqrt{x}+1)^2$$

$$f'(x) = \left(\frac{1}{2\sqrt{x}}\right)(\sqrt{x}+1) + (\sqrt{x}+1)\left(\frac{1}{2\sqrt{x}}\right) = 2(\sqrt{x}+1)\left(\frac{1}{2\sqrt{x}}\right) = \frac{\sqrt{x}+1}{\sqrt{x}} = 1 + \frac{\sqrt{x}}{x}$$

Exercice 34 :

$$f(x) = \frac{3}{4x} - \frac{2x}{5}$$

$$f'(x) = \frac{3}{4}\left(-\frac{1}{x^2}\right) - \frac{2}{5} = \frac{-15-8x^2}{20x^2}$$

Exercice 35 :

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

$$f'(x) = -\frac{-2(1-2x) + (1-2x)(-2)}{(1-2x)^4} = -\frac{-4(1-2x)}{(1-2x)^4} = \frac{4(1-2x)}{(1-2x)^4}$$

Exercice 36 :

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

$$f'(x) = \frac{(2x-2)(4-x) - (x^2-2x+3)(-1)}{(4-x)^2} = \frac{-2x^2+8x+2x-8+x^2-2x+3}{(4-x)^2} = \frac{-x^2+8x-5}{(4-x)^2}$$

Exercice 37 :

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

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