

Calculer la dérivée des fonctions suivantes (résultats factorisés pour 3) 7) et 9)).

$$1) f(x) = 3x^4 - 4x^3 + x^2 - 16 \quad f'(x) = \underline{12x^3 - 12x^2 + 2x} = \underline{2x(6x^2 - 6x + 1)}$$

$\Delta = 12$

$$2) f(x) = \frac{5}{2}x^3 + \frac{3}{4}x^2 - \frac{2x}{3} \quad f'(x) = \underline{\frac{15}{2}x^2 + \frac{3}{2}x - \frac{2}{3}}$$

$$3) f(x) = (3x^2 - 7x)^4 \quad f'(x) = \underline{4(3x^2 - 7x)^3(6x - 7)}$$

$$4) f(x) = \sqrt[4]{3x} = (3x)^{1/4}$$

$$f'(x) = \frac{1}{4}(3x)^{\frac{1}{4}-1} \cdot 3 = \frac{3}{4}(3x)^{-3/4} = \frac{3}{4} \cdot \frac{1}{(3x)^{3/4}} = \frac{3}{4} \cdot \frac{1}{\sqrt[4]{(3x)^3}} = \underline{\frac{3}{4\sqrt[4]{27x^3}}}$$

$$5) f(x) = \frac{1}{(2x-5)^5} = (2x-5)^{-5}$$

$$f'(x) = -5(2x-5)^{-6} \cdot 2 = -10 \cdot \frac{1}{(2x-5)^6} = \underline{-\frac{10}{(2x-5)^6}}$$

$$6) f(x) = (x^2 - 3)\sqrt{1-2x}$$

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

$$\left| \begin{array}{l} u = x^2 - 3 \\ u' = 2x \end{array} \right. \quad \left| \begin{array}{l} v = \sqrt{1-2x} \\ v' = \frac{-2}{2\sqrt{1-2x}} = \frac{-1}{\sqrt{1-2x}} \end{array} \right.$$

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

$$7) f(x) = (4x+1)^2(2-x)$$

$$f'(x) = 8(4x+1)(2-x) + (4x+1)^2(-1) = 8(4x+1)(2-x) - (4x+1)^2$$

$$\left| \begin{array}{l} u = (4x+1)^2 \\ u' = 2(4x+1) \cdot 4 = 8(4x+1) \end{array} \right. \quad \left| \begin{array}{l} v = 2-x \\ v' = -1 \end{array} \right.$$

$$= (4x+1) \left[\frac{8(2-x) - (4x+1)}{16-8x-4x-1} \right] = (4x+1)(-12x+15) = \underline{-3(4x+1)(4x-5)}$$

$$8) f(x) = \frac{4-x^3}{3x-7}$$

$$f'(x) = \frac{-3x^2(3x-7) - (4-x^3) \cdot 3}{(3x-7)^2} = \frac{-9x^3+21x^2-12+3x^3}{(3x-7)^2}$$

$$\left| \begin{array}{l} u = 4-x^3 \\ u' = -3x^2 \end{array} \right. \quad \left| \begin{array}{l} v = 3x-7 \\ v' = 3 \end{array} \right.$$

$$= \underline{\frac{-6x^3+21x^2-12}{(3x-7)^2}} = \underline{\frac{-3(2x^3-7x^2+4)}{(3x-7)^2}}$$

$$9) f(x) = \frac{(x+2)^3}{(2x-1)^2}$$

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

$$\left| \begin{array}{l} u = (x+2)^3 \\ u' = 3(x+2)^2 \cdot 1 = 3(x+2)^2 \end{array} \right. \quad \left| \begin{array}{l} v = (2x-1)^2 \\ v' = 2(2x-1) \cdot 2 = 4(2x-1) \end{array} \right.$$

$$= \frac{(x+2)^2(2x-1) [3(2x-1) - 4(x+2)]}{(2x-1)^4} = \frac{(x+2)^2(6x-3-4x-8)}{(2x-1)^3} = \underline{\frac{(x+2)^2(2x-11)}{(2x-1)^3}}$$