

Feuille d'exercice n° 02 : Fonctions usuelles – Fiche d'entraînement – Corrigé

**Exercice 1**

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| 1) $f'(x) = \frac{-2}{(x-1)^2}$                                | 12) $f'(x) = \frac{1}{2\sqrt{x}} \cdot 10^{\sqrt{x}} \cdot \ln 10$                 |
| 2) $f'(x) = 20x^3 + 15x^2 + 34x - 3$                           | 13) $f'(x) = -2xe^{3-x^2}$   |
| 3) $f'(x) = -\frac{25}{x^6}$                                   | 14) $f'(x) = \frac{2e^{2x}(x-1)}{x^3}$   |
| 4) $f'(x) = -\frac{25}{x^6} - \frac{6}{x^3}$                   | 15) $f'(x) = 3^{2x^2} \left( 4x\sqrt{x} \cdot \ln 3 + \frac{1}{2\sqrt{x}} \right)$ |
| 5) $f'(x) = -\frac{1}{2x\sqrt{x}}$                             | 16) $f'(x) = \frac{8x^3 - 3x^2 + 6x - 3}{2x^4 - x^3 + 3x^2 - 3x}$                  |
| 6) $f'(x) = -\frac{3}{2\sqrt{x^5}}$                            | 17) $f'(x) = -\frac{2e^x}{e^{2x} - 1}$   |
| 7) $f'(x) = \frac{2}{3\sqrt[3]{x}} + \frac{1}{2\sqrt{x}}$      | 18) $f'(x) = \frac{1}{1-x^2}$  |
| 8) $f'(x) = 4(x^2 + 3x - 2)^3(2x + 3)$                         | 19) $f'(x) = \frac{1-2x}{2x(1-x)}$   |
| 9) $f'(x) = \frac{x-1}{\sqrt{x^2-2x+3}}$                       | 20) $f'(x) = \frac{2}{3x(x+2)}$  |
| 10) $f'(x) = \frac{5x^4 - 3x^2}{4\sqrt[4]{(x^5 - x^3 - 2)^3}}$ | 21) $f'(x) = \frac{5x-1}{(x-2)(2x-1)}$   |
| 11) $f'(x) = -\frac{4x}{3\sqrt[3]{(x^4-1)^2(x^2-1)^2}}$        |  |

**Exercice 2**

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|--|---|
| 1) $f'(x) = 6x^2 \cos(2x^3)$                                 | 4) $f'(x) = \frac{2x(-2\cos(2x^3) - 6x^3\sin(2x^3) - 15x\sin(2x^3))}{\cos^2(2x^3)}$ |
| 2) $f'(x) = 5x^4(1 + \tan^2(x^5))$                           | 5) $f'(x) = 15x^4 \sin^2(x^5) \cos(x^5)$  |
| 3) $f'(x) = 2x(-2x^5 \sin x^2 - 3 \sin x^2 + 5x^3 \cos x^2)$ | 6) $f'(x) = 12x(-3x^2 + 2) \sin(-3x^2 + 2)^2$                                       |

**Exercice 3** Calculer les dérivées des fonctions suivantes :

- |                                  |                             |
|----------------------------------|-----------------------------|
| 1) $f'(x) = \frac{15x^{1/4}}{4}$ | 3) $f'(x) = \frac{20}{x^6}$ |
| 2) $f'(x) = \frac{5}{6x^{1/3}}$  | 4) $f'(x) = -\frac{9}{x^4}$ |

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

$$6) f'(x) = \frac{1}{3x^{2/3}} + \frac{1}{5x^{4/5}}$$

#### Exercice 4

$$1) f'(x) = \frac{-8x^7 + 9x^6 - 12x^2 + 6x}{4x^{10} - 8x^5 + 4}$$

$$2) f'(x) = \frac{9x^6 - 24x^3 - 18x^2}{9x^6 - 12x^3 + 4}$$

$$3) f'(x) = \frac{12x^8 - 12x^5 + 100x^4 + 20x}{9x^8 + 30x^4 + 25}$$

$$4) f'(x) = \frac{56x^{14/3} + 144x^3 - 8x^{8/3} - 72x - 50x^{2/3}}{12x^{10/3} + 36x^{5/3} + 27}$$

#### Exercice 5

$$1) f'(x) = \frac{15x^2}{\sqrt{1 - 25x^6}}$$

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

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

$$4) f'(x) = \frac{30x(\operatorname{Arcsin}(5x^2))^2}{\sqrt{1 - 25x^4}}$$

$$5) f'(x) = \frac{45x^4(3x^5 + 1)^2}{\sqrt{1 - (3x^5 + 1)^6}}$$

$$6) f'(x) = -\frac{16x \operatorname{Arccos}(4x^2)}{\sqrt{1 - 16x^4}}$$

$$7) f'(x) = \frac{18x^2(-2x^3 - 3)^2}{\sqrt{1 - (-2x^3 - 3)^6}}$$

#### Exercice 6

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

$$2) f'(x) = \frac{3}{x \ln 3x^3}$$

$$3) f'(x) = -\frac{3 \sin \ln 4x^3}{x}$$

$$4) f'(x) = 6xe^{3x^2 + 3x^2}$$

$$5) f'(x) = 24x^2(4x^3 + 5)e^{(4x^3 + 5)^2}$$

$$6) f'(x) = \frac{-3x^3 \ln(4x^2) - 2x^3 - 8}{x}$$

$$7) f'(x) = \frac{5(x^3 - 12)}{x(x^3 - 3)}$$

$$8) f'(x) = 4xe^{5x^4 - 4x^2 - 3}(5x^2 - 2)$$

#### Exercice 7 Déterminer les limites des expressions suivantes.

$$1) +\infty$$

$$2) \frac{1}{2}$$

$$3) 0$$

$$4) \frac{\pi}{16}$$

$$5) 0$$

$$6) \frac{1}{4}$$

$$7) \frac{\pi}{2}$$

$$8) -\infty$$

$$9) 1$$

$$10) 0$$

#### Exercice 8 Tableaux à venir.

$$\mathbf{1)} \quad f' : x \mapsto \frac{x-1}{e^x - x}$$

$$\mathbf{2)} \quad g' : x \mapsto (e^x - 1)(e^x - 2)$$

$$\mathbf{3)} \quad \varphi' : x \mapsto -\frac{(x-1)(x-3)}{e^x}$$

$$\mathbf{4)} \quad \psi' : x \mapsto \frac{e^{2x}(2x + \sqrt{6} + 4)(2x - \sqrt{6} + 4)}{2(x+2)^4}.$$