

1re

MATHÉMATIQUES

Enseignement de Spécialité

La fonction exponentielle

Correction

# CALCUL DE DÉRIVÉES

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## CORRECTION

Sans aucune justification, calculons les dérivées des fonctions suivantes:

Petit rappel:  $(e^{f(x)})' = f'(x) \times e^{f(x)}$ , pour tout  $x \in \mathbb{R}$ .

$$1. g(x) = 4(x^2 - 2x) \times e^{(6x-3)^2}.$$

$$\text{Ici: } g(x) = 4(x^2 - 2x) \times e^{36x^2+9-36x}.$$

$$\begin{aligned} \text{Dans ces conditions: } g'(x) &= (4(2x - 2)) \times (e^{36x^2+9-36x}) \\ &\quad + (4(x^2 - 2x)) \times ((72x - 36) \times e^{36x^2+9-36x}) \\ &= e^{36x^2+9-36x} \times [(8x - 8) + (4x^2 - 8x) \times (72x - 36)] \\ &= e^{36x^2+9-36x} \times (288x^3 - 720x^2 + 296x - 8). \end{aligned}$$

$$\text{D'où: } g'(x) = (288x^3 - 720x^2 + 296x - 8) e^{(36x^2-36x+9)}.$$

$$2. g(x) = -e^{3x^3-9x} + x e^{10x^2-11}.$$

$$\begin{aligned} g'(x) &= ((-9x^2 + 9) \times e^{3x^3-9x}) + [(1) \times (e^{10x^2-11}) + (x) \times ((20x) \times e^{10x^2-11})] \\ &= (-9x^2 + 9) \times e^{3x^3-9x} + e^{10x^2-11} (1 + 20x^2). \end{aligned}$$

$$\text{D'où: } g'(x) = (-9x^2 + 9) e^{3x^3-9x} + (20x^2 + 1) e^{10x^2-11}.$$

$$3. g(x) = \frac{x^3 e^{-x^6-30} - 6x}{x e^{x^9}}$$

Ici:  $g(x) = \frac{x^2 e^{-x^6-30} - 6}{e^{x^9}}$ .

Dans ces conditions:

$$\begin{aligned} g'(x) &= \frac{[(2x) \times (e^{-x^6-30}) + (x^2) \times (-6x^5) e^{-x^6-30}] \times (e^{x^9}) - (x^2 e^{-x^6-30} - 6) \times ((9x^8) \times e^{x^9})}{(e^{x^9})^2} \\ &= \frac{[e^{-x^6-30} \times (2x - 6x^7)] - (e^{-x^6-30}) \times (9x^{10}) + 54x^8}{e^{x^9}} \\ &= \frac{e^{-x^6-30} \times (2x - 6x^7 - 9x^{10}) + 54x^8}{e^{x^9}}. \end{aligned}$$

D'où:  $g'(x) = (-9x^{10} - 6x^7 + 2x) e^{-x^9-x^6-30} + 54x^8 e^{-x^9}$ .