

## DERIVADAS DE FUNCIONES

### Ejercicio nº1

Halla las derivadas de las siguientes funciones:

$$a(x) = 2x^2 + 4x + 6$$

$$b(x) = \frac{x^3}{2} + \frac{x}{3} - 5$$

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

### Ejercicio nº2

Halla las derivadas de las siguientes funciones:

$$a(x) = (x^2 + 4x)^3$$

$$b(x) = \frac{(x^2 + 2x)^2}{2}$$

$$c(x) = (3+x)(x^2+1) + x^2$$

### Ejercicio nº3

Halla las derivadas de las siguientes funciones:

$$a(x) = \frac{x}{x-1}$$

$$b(x) = \frac{x^2+1}{x+1}$$

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

### Ejercicio nº4

Halla las derivadas de las siguientes funciones:

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

$$b(x) = \frac{\sqrt{x+1}}{x-1}$$

### Ejercicio nº5

Halla la derivada de las funciones:

$$a(x) = \ln(x^2 + 4x)$$

$$b(x) = 3e^{(x^2+x)}$$

### Ejercicio nº7

Dada la función  $f(x) = \frac{x^2-9}{x^2-5x-6}$ , hallar el valor de su derivada en  $x = 1$ .

### Ejercicio nº8

Se considera la función:

$$f(x) = \begin{cases} 2x+3 & \text{si } x \leq -1 \\ e^{2x+2} & \text{si } x > 1 \end{cases}$$

Hallar su derivada.

$$\textcircled{1} \quad a(x) = 2x^2 + 4x + 6 \quad a'(x) = 4x + 4$$

$$b(x) = \frac{x^3}{2} + \frac{x}{3} - 5 \quad b'(x) = \frac{3x^2}{2} + \frac{1}{3}$$

$$c(x) = 3(x^2 + 4x) + \frac{x}{2} = 3x^2 + 12x + \frac{x}{2}$$

$$c'(x) = 6x + 12 + \frac{1}{2} = 6x + \frac{25}{2}$$

$$\textcircled{2} \quad a(x) = (x^2 + 4x)^3 \quad a'(x) = 3(x^2 + 4x)^2 \cdot (x^2 + 4x)'$$

$$a'(x) = 3(x^2 + 4x)^2 \cdot (2x + 4)$$

$$b(x) = \frac{(x^2 + 2x)^2}{2} \quad b'(x) = \frac{2(x^2 + 2x)}{2} \cdot (2x + 2)$$

$$b'(x) = (x^2 + 2x)(2x + 2)$$

$$b'(x) = 2x^3 + 2x^2 + 4x^2 + 4x$$

$$b'(x) = 2x^3 + 6x^2 + 4x$$

$$c(x) = (3+x)(x^2+1) + x^2 = 3x^2 + 3 + x^3 + x + x^2$$

$$c(x) = x^3 + 4x^2 + x + 3 \quad c'(x) = 3x^2 + 8x + 1$$

$$(3) \quad a(x) = \frac{x}{x-1}$$

$$a'(x) = \frac{x'(x-1) - x(x-1)'}{(x-1)^2} = \frac{1 \cdot (x-1) - x \cdot 1}{(x-1)^2} =$$

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

$$b(x) = \frac{x^2+1}{x+1}$$

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

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

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

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

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

$$c'(x) = \frac{2x(x^2+2x-1) - (x^2+2) \cdot (2x+2)}{(x^2+2x-1)^2} = \frac{2x^2 - 6x - 4}{(x^2+2x-1)^2}$$

(4)

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

$$a'(x) = \frac{1}{2} (2x^2+1)^{-1/2} (2x^2+1)'$$

$$a'(x) = \frac{1}{2\sqrt{2x^2+1}} \cdot 4x = \frac{2x}{\sqrt{2x^2+1}}$$

$$b(x) = \frac{\sqrt{x+1}}{x-1} = \frac{(x+1)^{1/2}}{x-1}$$

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

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

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

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

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

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$$a(x) = \ln(x^2 + 4x)$$

$$a'(x) = \frac{(x^2 + 4x)'}{x^2 + 4x} = \frac{2x + 4}{x^2 + 4x}$$

$$b(x) = 3e^{(x^2 + x)}$$

$$b'(x) = 3e^{(x^2 + x)} \cdot (x^2 + x)' =$$

$$b'(x) = 3 \cdot e^{(x^2 + x)} \cdot (2x + 1)$$

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$$f(x) = \frac{x^2 - 9}{x^2 - 5x - 6}$$

$$f'(x) = \frac{(x^2 - 9)' \cdot (x^2 - 5x - 6) - (x^2 - 9) \cdot (x^2 - 5x - 6)'}{(x^2 - 5x - 6)^2} =$$

$$f'(x) = \frac{2x(x^2 - 5x - 6) - (x^2 - 9) \cdot (2x - 5)}{(x^2 - 5x - 6)^2} =$$

$$f'(x) = \frac{2x^3 - 10x^2 - 12x - 2x^3 + 5x^2 + 18x^2 - 45}{(x^2 - 5x - 6)^2} = \frac{-5x^2 + 6x - 45}{(x^2 - 5x - 6)^2}$$

$$f'(4) = \frac{-5 \cdot 1^2 + 6 \cdot 1 - 45}{(1^2 - 5 \cdot 1 - 6)^2} = \frac{-44}{100} = \left( \frac{-11}{25} \right)$$

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$$f(x) = \begin{cases} 2x+3 & \text{si } x \leq -1 \\ e^{2x+2} & \text{si } x > -1 \end{cases}$$

$$f'(x) = \begin{cases} (2x+3)' & \text{si } x \leq -1 \\ (2x+2)' \cdot e^{2x+2} & \text{si } x > -1 \end{cases}$$

$$f'(x) = \begin{cases} 2 & \text{si } x \leq -1 \\ 2 \cdot e^{2x+2} & \text{si } x > -1 \end{cases}$$

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