# DERIVADAS

**Definición de Derivada** de una función $f(x)$ en un punto $x = a$: la denotamos por $f'(a)$ y se define como: $f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$ ; o bien de la forma: $f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$ donde $x = a + h$.

## TABLAS DE DERIVADAS

| Suma | Multiplicación | Cociente de funciones | Producto de constante por f(x) |
|---|---|---|---|
| $y = f(x) \pm g(x)$<br>$y' = f'(x) \pm g'(x)$ | $y = f(x) \cdot g(x)$<br>$y' = f'g + fg'$ | $y = \frac{f(x)}{g(x)}; \quad y' = \frac{f'g - fg'}{g^2}$ | $y = kf(x)$<br>$y' = kf'(x)$ |

| | |
|---|---|
| $f(x) = k \to f'(x) = 0$ | $f(x) = x^k \to f'(x) = kx^{k-1}$ |
| $f(x) = e^x \to f'(x) = e^x$ | $f(x) = a^x \to f'(x) = a^x Lna$ |
| $f(x) = Lnx \to f'(x) = \frac{1}{x}$ | $f(x) = \lg_a x \to f'(x) = \frac{1}{xLna}$ |
| $f(x) = senx \to f'(x) = \cos x$ | $f(x) = \cos x \to f'(x) = -senx$ |
| $f(x) = tg(x) \to f'(x) = \frac{1}{\cos^2 x} = 1 + tg^2 x$ | $f(x) = \cot x \to f'(x) = \frac{-1}{sen^2 x}$ |
| $f(x) = Arcsenx \to f'(x) = \frac{1}{\sqrt{1-x^2}}$ | $f(x) = Arc\ f\cos x \to f'(x) = \frac{1}{\sqrt{1-x^2}}$ |
| $f(x) = Arctgx \to f'(x) = \frac{1}{1+x^2}$ | $f(x) = Arc\cot x \to f'(x) = \frac{-1}{1+x^2}$ |
| $y = f(x)^k \to y' = kf(x)^{k-1} f'(x)$ | $y = a^{f(x)} \to y' = a^{f(x)} f'(x) Lna$ |
| $y = e^{f(x)} \to y' = e^{f(x)} f'(x)$ | $y = Lnf(x) \to y' = \frac{f'(x)}{f(x)}$ |
| $y = \cos f(x) \to y' = -senf(x) \cdot f'(x)$ | $y = sen\ f(x) \to y' = \cos f(x) \cdot f'(x)$ |
| $y = tg\ f(x) \to y' = \frac{f'(x)}{\sqrt{1 - f(x)^2}}$ | $y = \cot f(x) \to y' = \frac{-f'(x)}{sen^2 f(x)}$ |
| $y = Arc\ sen\ f(x) \to y' = \frac{f'(x)}{\sqrt{1 - f(x)^2}}$ | $y = Arc\cos f(x) \to y' = \frac{-f'(x)}{\sqrt{1 - f(x)^2}}$ |
| $y = Arc\ tg\ f(x) \to y' = \frac{f'(x)}{1 + f(x)^2}$ | $y = Arc\cot f(x) \to y' = \frac{-f'(x)}{1 + f(x)^2}$ |
| $f(x) = \sqrt{x} \to f'(x) = \frac{1}{2\sqrt{x}}$ | $y = \sqrt{f(x)} \to y' = \frac{f'(x)}{2\sqrt{f(x)}}$ |
| $f(x) = \sqrt[n]{x} \to f'(x) = \frac{1}{n\sqrt[n]{x^{n-1}}}$ | $y = \sqrt[n]{f(x)} \to y' = \frac{f'(x)}{n\sqrt[n]{f(x)^{n-1}}}$ |

**EJERCICIOS DE REPASO.**

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|---|---|
| 1.- $f(x) = Lnx^3$ | $f'(x) = \frac{3}{x}$ |
| 2.- $f(x) = 7x^4 - 5x^2 + 9x$ | $f'(x) = 28x^3 - 30x + 9$ |
| 3.- $f(x) = 7x^2 - 25x - 4$ | $f'(x) = 14x - 25$ |
| 4.- $f(x) = x^{\frac{2}{3}}$ | $f'(x) = \frac{2}{3}x^{-\frac{1}{3}}$ |
| 5.- $f(x) = 5x^4 - 7x^3 + 6x^2 - 7$ | $f'(x) = 20x^3 - 21x^2 + 12x$ |
| 6.- $f(x) = (x^2 + x + 1)^4$ | $f'(x) = 4(x^2 + x + 1)^3(2x + 1)$ |
| 7.- $f(x) = (3x^2 - 4x + 6)^{-4}$ | $f'(x) = -4(3x^2 - 4x + 6)^{-5}(6x - 4)$ |
| 8.- $f(x) = (6x^2 - 9x - 7)^{-\frac{1}{2}}$ | $f'(x) = -\frac{1}{2}(6x^2 - 9x - 7)^{-\frac{3}{2}}(12x - 9)$ |
| 9.- $f(x) = Ln(3x)$ | $f'(x) = \frac{1}{x}$ |
| 10.- $f(x) = Ln\frac{x^2 + 1}{x^2 - 5}$ | $f'(x) = \frac{2x}{x^2 + 1} - \frac{2x}{x^2 - 5}$ |
| 11.- $f(x) = Ln(x^2 + 1)$ | $f'(x) = \frac{2x}{x^2 + 1}$ |
| 12.- $f(x) = Ln(x^2 - x + 5)^3$ | $f'(x) = \frac{1}{(x^2 - x + 5)^3}3(x^2 - x + 6)^2(2x - 1)$ |
| 13.- $f(x) = e^{x^2 + x + 1}$ | $f'(x) = (2x + 1)e^{x^2 + x + 1}$ |
| 14.- $f(x) = 25^{x^2 + x + 1}$ | $f'(x) = 25^{x^2 + x + 1}Ln25(2x + 1)$ |