

2.2 OTRAS REGLAS DE DERIVACIÓN

• $F(x) = f(x) \cdot g(x)$	→	$F'(x) = f'(x) \cdot g(x) + f(x) \cdot g'(x)$
• $F(x) = \frac{f(x)}{g(x)}$	→	$F'(x) = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{(g(x))^2}$
• $f(x) = \text{sen } x$	→	$f'(x) = \text{cos } x$
• $f(x) = \text{cos } x$	→	$f'(x) = -\text{sen } x$
• $f(x) = \text{tg } x$	→	$f'(x) = 1 + \text{tg}^2 x = \frac{1}{\text{cos}^2 x}$
• $f(x) = \text{arc sen } x$	→	$f'(x) = \frac{1}{\sqrt{1-x^2}}$
• $f(x) = \text{arc cos } x$	→	$f'(x) = \frac{-1}{\sqrt{1-x^2}}$
• $f(x) = \text{arc tg } x$	→	$f'(x) = \frac{1}{1+x^2}$
• $f(x) = e^x$	→	$f'(x) = e^x$
• $f(x) = a^x$	→	$f'(x) = a^x \cdot \ln a$
• $f(x) = \ln x$	→	$f'(x) = \frac{1}{x}$
• $f(x) = \log_a x$	→	$f'(x) = \frac{1}{x} \cdot \frac{1}{\ln a}$

Halla la derivada de las siguientes funciones:

1 $f(x) = 3 \text{ sen } x - 2 \text{ cos } x$ → $f'(x) =$

2 $f(x) = 4 \text{ tg } x + e^x$ → $f'(x) =$

3 $f(x) = \frac{x \ln x}{F(x) \cdot G(x)}$ → $f'(x) = \frac{1 \cdot \ln x + x \cdot \frac{1}{x}}{F'(x) \cdot G(x) + F(x) \cdot G'(x)} = \ln x + 1$

4 $f(x) = x e^x$ → $f'(x) =$

5 $f(x) = (x^2 + 1) \cdot \text{sen } x$ → $f'(x) =$

6 $f(x) = 2^x \cdot \text{tg } x$ → $f'(x) =$

7 $f(x) = (x^2 - \frac{x}{3}) e^x$ → $f'(x) =$

8 $f(x) = (x^3 - 2x + 1) \cdot \text{cos } x$ → $f'(x) =$

- 9 $f(x) = 3^x + \ln x - \frac{1}{x}$ → $f'(x) =$
- 10 $f(x) = 2^x + \log_2 x$ → $f'(x) =$
- 11 $f(x) = x^2 e^x + 2x \ln x$ → $f'(x) =$
- 12 $f(x) = \sqrt{x} \operatorname{sen} x - \log_3 5$ → $f'(x) =$
- 13 $f(x) = \frac{4x}{x+1} = \frac{F(x)}{G(x)}$ → $f'(x) = \frac{F'(x) \cdot G(x) - F(x) \cdot G'(x)}{(G(x))^2} = \frac{4 \cdot (x+1) - 4x \cdot 1}{(x+1)^2} = \frac{4x+4-4x}{(x+1)^2} = \frac{4}{(x+1)^2}$
- 14 $f(x) = \frac{x^2 - 1}{2x + 2}$ → $f'(x) =$
- 15 $f(x) = \frac{x+1}{x-2}$ → $f'(x) =$
- 16 $f(x) = \frac{\ln x}{x}$ → $f'(x) =$
- 17 $f(x) = \frac{e^x + e^{-x}}{2}$ → $f'(x) =$
- 18 $f(x) = \frac{1}{x^2 + 1}$ → $f'(x) =$
- 19 $f(x) = \frac{x^3}{x+2}$ → $f'(x) =$
- 20 $f(x) = \frac{2x-1}{3x+2}$ → $f'(x) =$
- 21 $f(x) = \frac{x^2}{x^2-1}$ → $f'(x) =$
- 22 $f(x) = \frac{\sqrt{x}}{x+2}$ → $f'(x) =$
- 23 $f(x) = (x^2 - 1) \sqrt{x}$ → $f'(x) =$
- 24 $f(x) = 3 \operatorname{arc} \operatorname{sen} x$ → $f'(x) =$
- 25 $f(x) = 2 \operatorname{arc} \operatorname{cos} x + e^x$ → $f'(x) =$
- 26 $f(x) = 5 \operatorname{arc} \operatorname{tg} x$ → $f'(x) =$
- 27 $f(x) = \frac{x e^x - \ln x}{2}$ → $f'(x) =$
- 28 $f(x) = 3^x \operatorname{sen} x - \log_2 x$ → $f'(x) =$

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$$\color{red}{\blacklozenge} f'(x) = 3 \cos x + 2 \operatorname{sen} x$$

$$\diamond 2 \quad f'(x) = 4(1 + \operatorname{tg}^2 x) + e^x = 4 + 4 \operatorname{tg}^2 x + e^x$$

$$\diamond 4 \quad f'(x) = 1 \cdot e^x + x \cdot e^x = e^x + x e^x$$

$$\diamond 5 \quad f'(x) = 2x \cdot \operatorname{sen} x + (x^2 + 1) \cdot \cos x = \\ = 2x \operatorname{sen} x + x^2 \cos x + \cos x$$

$$\diamond 6 \quad f'(x) = 2^x \cdot \ln 2 \cdot \operatorname{tg} x + 2^x \cdot (1 + \operatorname{tg}^2 x)$$

$$\diamond 7 \quad f'(x) = 2x - \left(\frac{1}{3} \cdot e^x + \frac{x}{3} \cdot e^x \right) = \\ = 2x - \frac{1}{3} \cdot e^x - \frac{x}{3} \cdot e^x$$

$$\diamond 8 \quad f'(x) = (3x^2 - 2) \cdot \cos x + (x^3 - 2x + 1) \cdot (-\operatorname{sen} x) = \\ = (3x^2 - 2) \cdot \cos x - (x^3 - 2x + 1) \cdot \operatorname{sen} x$$

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$$\diamond 9 \quad f'(x) = 3^x \cdot \ln 3 + \frac{1}{x} - \frac{1}{x^2}$$

$$\diamond 10 \quad f'(x) = 2^x \cdot \ln 2 + \frac{1}{x} - \frac{1}{\ln 2}$$

$$\diamond 11 \quad f'(x) = 2x \cdot e^x + x^2 \cdot e^x + 2 \cdot \ln x + 2x \cdot \frac{1}{x} = \\ = 2x e^x + x^2 e^x + 2 \ln x + 2$$

$$\diamond 12 \quad f'(x) = \frac{1}{2\sqrt{x}} \operatorname{sen} x + \sqrt{x} \cos x = \\ = \frac{\operatorname{sen} x}{2\sqrt{x}} + \sqrt{x} \cos x = \frac{\operatorname{sen} x + 2x \cos x}{2\sqrt{x}}$$

$$\diamond 13 \quad f(x) = \frac{(x+1) \cdot (x-1)}{2(x+1)} = \frac{(x-1)}{2} \rightarrow$$

$$\rightarrow f'(x) = \frac{1}{2}$$

Otra forma:

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

$$\diamond 14 \quad f'(x) = \frac{-3}{(x-2)^2}$$

$$\diamond 15 \quad f'(x) = \frac{\frac{1}{x} \cdot x - \ln x \cdot 1}{x^2} = \frac{1 - \ln x}{x^2}$$

$$\diamond 16 \quad f'(x) = \frac{e^x - e^{-x}}{2}$$

$$\diamond 17 \quad f'(x) = \frac{-2x}{(x^2+1)^2}$$

$$\diamond 18 \quad f'(x) = \frac{3x^2(x+2) - x^3 \cdot 1}{(x+2)^2} = \frac{2x^3 + 6x^2}{(x+2)^2}$$

$$\diamond 19 \quad f'(x) = \frac{2(3x+2) - (2x-1) \cdot 3}{(3x+2)^2} = \frac{7}{(3x+2)^2}$$

$$\diamond 20 \quad f'(x) = \frac{2x(x^2-1) - x^2 \cdot 2x}{(x^2-1)^2} = \frac{-2x}{(x^2-1)^2}$$

$$\diamond 21 \quad f'(x) = \frac{\frac{1}{2\sqrt{x}}(x+2) - \sqrt{x} \cdot 1}{(x+2)^2} = \frac{-x+2}{2\sqrt{x} \cdot (x+2)^2}$$

$$\diamond 22 \quad f'(x) = 2x \cdot \sqrt{x} + (x^2-1) \cdot \frac{1}{2\sqrt{x}} = \\ = \frac{4x^2 + x^2 - 1}{2\sqrt{x}} = \frac{5x^2 - 1}{2\sqrt{x}}$$

$$\diamond 23 \quad f'(x) = \frac{3}{\sqrt{1-x^2}}$$

$$\diamond 24 \quad f'(x) = \frac{-2}{\sqrt{1-x^2}} + e^x$$

$$\diamond 25 \quad f'(x) = \frac{5}{1+x^2}$$

$$\diamond 26 \quad f'(x) = \frac{1 \cdot e^x + x e^x - \frac{1}{x}}{2} = \frac{x e^x + x^2 e^x - 1}{2x}$$

$$\diamond 27 \quad f'(x) = 3^x \cdot \ln 3 \cdot \operatorname{sen} x + 3^x \cdot \cos x - \left(\log_2 x + \right. \\ \left. + x \cdot \frac{1}{x} \cdot \frac{1}{\ln 2} \right) = 3^x \ln 3 \cdot \operatorname{sen} x + \\ + 3^x \cos x - \log_2 x - \frac{1}{\ln 2}$$

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$$\diamond 1 \quad f'(x) = 6(x^2+5)^5(2x) = 12x(x^2+5)^5$$

$$\diamond 2 \quad f'(x) = \cos(x^2-1) \cdot 2x = 2x \cos(x^2-1)$$

$$\diamond 3 \quad f'(x) = -\operatorname{sen}(\ln x) \cdot \frac{1}{x} = \frac{-1}{x} \operatorname{sen}(\ln x)$$

$$\diamond 4 \quad f'(x) = [1 + \operatorname{tg}^2(2x-3x^2)] \cdot (2-6x)$$

$$\diamond 5 \quad f'(x) = e^{3x^2+1} \cdot 6x = 6x \cdot e^{3x^2+1}$$

$$\diamond 6 \quad f'(x) = 2^{4x+1} \cdot \ln 2 \cdot 4 = (4 \cdot \ln 2) \cdot 2^{4x+1}$$

$$\diamond 7 \quad f'(x) = 2 \cos x (-\operatorname{sen} x) = -2 \cos x \operatorname{sen} x$$

$$\diamond 8 \quad f'(x) = e^{3x} \cdot 3 = 3 \cdot e^{3x}$$

$$\diamond 9 \quad f'(x) = \frac{6x}{3x^2-6}$$