

Función derivada

Nivel: bachillerato

Calcula la 1ª y 2ª derivada, simplificando el resultado, de

a) $f(x) = x^3 - 2x^2 + x + 1$

b) $f(x) = 2x^3 - 8x + 1$

c) $f(x) = (x+1)^2(x-2)$

d) $f(x) = \frac{x^3}{(1+x)^2}$

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

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

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

h) $f(x) = \frac{2}{x^2 - 1}$

i) $f(x) = \frac{x^2}{(x-1)^2}$

j) $f(x) = \frac{x+3}{x-2}$

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

l) $f(x) = \frac{16}{x^2(x-1)}$

m) $f(x) = \frac{x}{x^2 - 1}$

n) $f(x) = \frac{x^2}{x-1}$

o) $f(x) = \frac{x^2 - 1}{x}$

p) $f(x) = \frac{x^3}{x^2 - 1}$

q) $f(x) = \frac{x^2 - 6x + 5}{x - 3}$

r) $f(x) = x^4 - 6x^2$

s) $f(x) = -x^3 + 6x^2 - 9x + 8$

t) $f(x) = (x^5 - 3x^2)^3 \cdot (2 - 5x^3)^4 \cdot (4x + 7x^3)^6$



REWERDA

$$y = x^n \rightarrow y' = n \cdot x^{n-1}$$

$$y = k \cdot f \rightarrow y' = k \cdot f'$$

$$y = f \pm g \rightarrow y' = f' \pm g'$$

$$y = f \cdot g \rightarrow y' = f' \cdot g + f \cdot g'$$

$$y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

$$y = f^n \rightarrow y' = n \cdot f^{n-1} \cdot f'$$

1º

a) $f(x) = x^3 - 2x^2 + x + 1.$

$$f'(x) = 3x^2 - 2 \cdot 2x + 1 = 3x^2 - 4x + 1$$

$$f''(x) = 3 \cdot 2x - 4 = 6x - 4$$

b) $f(x) = 2x^3 - 8x + 1$

$$f'(x) = 2 \cdot 3x^2 - 8 = 6x^2 - 8.$$

$$f''(x) = 6 \cdot 2x = 12x.$$

c) COMO PRODUCTO.

$$y = (x+1)^2 \cdot (x-2)$$

$$\left. \begin{array}{l} f = (x+1)^2 \rightarrow f' = 2 \cdot (x+1) \\ g = (x-2) \rightarrow g' = 1. \end{array} \right\} \Rightarrow$$

$$y' = 2 \cdot (x+1) \cdot (x-2) + (x+1)^2 \cdot 1.$$

para hacer la 2ª derivada lo más sencillo es operar.

$$y' = 2(x^2 - 2x + x - 2) + x^2 + 2x + 1 = 3x^2 - 3$$

$$y'' = 3 \cdot 2x = 6x.$$

DESARROLLANDO.

$$y = (x^2 + 2x + 1) \cdot (x - 2) = x^3 - 2x^2 + 2x^2 - 4x + x - 2 = x^3 - 3x - 2$$

$$y' = 3x^2 - 3$$

$$y'' = 3 \cdot 2x = 6x.$$



$$\textcircled{d} \quad y = \frac{x^3}{(1+x)^2}$$

Recuerda $y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$ $y = f^n \rightarrow y' = n \cdot f^{n-1} \cdot f'$

En nuestro caso:

$$f = x^3 \rightarrow f' = 3x^2$$

$$g = (1+x)^2 \rightarrow g' = 2(1+x)^1 \cdot 1. \Rightarrow$$

$$\boxed{y'} = \frac{3x^2 \cdot (1+x)^2 - x^3 \cdot 2 \cdot (1+x)}{[(1+x)^2]^2} = \frac{3x^2 \cdot (1+x)^2 - 2x^3(1+x)}{(1+x)^4}$$
$$= \frac{x^2 \cdot (1+x) \cdot [3(1+x) - 2x]}{(1+x)^4} = \frac{x^2 \cdot [3 + 3x - 2x]}{(1+x)^3}$$

$$\boxed{y' = \frac{x^2 \cdot (3+x)}{(1+x)^3} = \frac{3x^2 + x^3}{(1+x)^3}} \quad (*)$$

y''

$$f = 3x^2 + x^3 \rightarrow f' = 6x + 3x^2$$

$$g = (1+x)^3 \rightarrow g' = 3 \cdot (1+x)^2 \cdot 1.$$

$$y'' = \frac{(6x + 3x^2) \cdot (1+x)^3 - (3x^2 + x^3) \cdot 3 \cdot (1+x)^2}{[(1+x)^3]^2}$$

$$= \frac{(1+x)^2 \cdot [(6x + 3x^2) \cdot (1+x) - 3 \cdot (3x^2 + x^3)]}{(1+x)^6}$$

$$= \frac{6x + 6x^2 + 3x^2 + 3x^3 - 9x^2 - 3x^3}{(1+x)^4} \Rightarrow \boxed{y'' = \frac{6x}{(1+x)^4}}$$

(*) se han efectuado las operaciones del numerador porque es MÁS sencillo derivar una suma que un producto.

© Recuerda

$$y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

$$y = \frac{x^2}{1+x}$$

$$\left. \begin{array}{l} f = x^2 \rightarrow f' = 2x \\ g = 1+x \rightarrow g' = 1 \end{array} \right\}$$

y'

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

y''

$$\left. \begin{array}{l} f = 2x - x^2 \rightarrow f' = 2 - 2x \\ g = (1+x)^2 \rightarrow g' = 2 \cdot (1+x)^1 \cdot 1 \end{array} \right\}$$

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

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

$$= \frac{2 + 2x - 2x - 2x^2 - 4x + 2x^2}{(1+x)^3} \Rightarrow$$

$$y'' = \frac{2}{(1+x)^3}$$



$$\textcircled{f} \quad y = \frac{1}{x^2 + x - 2}$$

$$\text{Recuerda } y = \frac{1}{f} \rightarrow y' = \frac{-f'}{f^2}$$

En nuestro caso

$$f = x^2 + x - 2 \rightarrow f' = 2x + 1$$

$$\Rightarrow \boxed{y' = \frac{-(2x+1)}{(x^2+x-2)^2}}$$

$$y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

$$f = -(2x+1) \rightarrow f' = -2$$

$$g = (x^2 + x - 2)^2 \rightarrow g' = 2 \cdot (x^2 + x - 2) \cdot (2x + 1)$$

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

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

$$= \frac{-2x^2 - 2x + 4 + 8x^2 + 8x + 2}{(x^2 + x - 2)^3}$$

$$\Rightarrow \boxed{y'' = \frac{6x^2 + 6x + 6}{(x^2 + x - 2)^3}}$$



$$\textcircled{g} \quad y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

$$y = \frac{x^2+1}{x^2-1}$$

y'

$$\left. \begin{aligned} f &= x^2+1 \longrightarrow f' = 2x \\ g &= x^2-1 \longrightarrow g' = 2x \end{aligned} \right\}$$

$$y' = \frac{2x \cdot (x^2-1) - (x^2+1) \cdot 2x}{(x^2-1)^2} = \frac{2x^3 - 2x - 2x^3 - 2x}{(x^2-1)^2}$$

$$\Rightarrow y' = \frac{-4x}{(x^2-1)^2}$$

y''

$$\left. \begin{aligned} f &= -4x \longrightarrow f' = -4 \\ g &= (x^2-1)^2 \longrightarrow g' = 2 \cdot (x^2-1)^1 \cdot 2x \end{aligned} \right\}$$

$$y'' = \frac{-4 \cdot (x^2-1)^2 - (-4x) \cdot 2 \cdot (x^2-1) \cdot 2x}{[(x^2-1)^2]^2} =$$

$$= \frac{(x^2-1) \cdot [-4 \cdot (x^2-1) + 16x^2]}{(x^2-1)^4} = \frac{-4x^2 + 4 + 16x^2}{(x^2-1)^3}$$

$$\Rightarrow y'' = \frac{12x^2+4}{(x^2-1)^3}$$



$$\textcircled{h} \quad y = \frac{k}{f} \rightarrow y' = \frac{-kf'}{f^2}$$

$$y = \frac{2}{x^2-1}$$

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

$$\text{Fórmula: } y = \frac{f}{g} \rightarrow y' = \frac{f'g - f \cdot g'}{g^2}$$

$$\left. \begin{aligned} f &= -4x \rightarrow f' = -4 \\ g &= (x^2-1)^2 \rightarrow g' = 2 \cdot (x^2-1)^1 \cdot 2x. \end{aligned} \right\}$$

$$y'' = \frac{-4 \cdot (x^2-1)^2 - (-4x) \cdot 2 \cdot (x^2-1) \cdot 2x}{[(x^2-1)^2]^2} =$$

$$= \frac{(x^2-1) \cdot [-4 \cdot (x^2-1) + 16x^2]}{(x^2-1)^4}$$

$$= \frac{-4x^2 + 4 + 16x^2}{(x^2-1)^3}$$

$$\Rightarrow \boxed{y'' = \frac{12x^2 + 4}{(x^2-1)^3}}$$

M_x

i) $y = \frac{x^2}{(x-1)^2}$

$$y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

y'

$$\left. \begin{aligned} f &= x^2 \rightarrow f' = 2x \\ g &= (x-1)^2 \rightarrow g' = 2 \cdot (x-1)^1 \cdot 1 \end{aligned} \right\}$$

$$y' = \frac{2x \cdot (x-1)^2 - x^2 \cdot 2 \cdot (x-1)}{[(x-1)^2]^2} = \frac{(x-1) \cdot [2x \cdot (x-1) - 2x^2]}{(x-1)^4}$$

$$y' = \frac{2x^2 - 2x - 2x^2}{(x-1)^3} \Rightarrow \boxed{y' = \frac{-2x}{(x-1)^3}}$$

y''

$$\left. \begin{aligned} f &= -2x \rightarrow f' = -2 \\ g &= (x-1)^3 \rightarrow g' = 3 \cdot (x-1)^2 \cdot 1 \end{aligned} \right\}$$

$$y'' = \frac{-2 \cdot (x-1)^3 - (-2x) \cdot 3 \cdot (x-1)^2}{[(x-1)^3]^2}$$

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

$$\Rightarrow \boxed{y'' = \frac{4x+2}{(x-1)^4}}$$

① Recuerda

$$y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

$$y = \frac{x+3}{x-2}$$

$$\left. \begin{array}{l} f = x+3 \rightarrow f' = 1 \\ g = x-2 \rightarrow g' = 1 \end{array} \right\}$$

$$y' = \frac{1 \cdot (x-2) - (x+3) \cdot 1}{(x-2)^2} = \frac{x-2-x-3}{(x-2)^2} \Rightarrow$$

$$y' = \frac{-5}{(x-2)^2}$$

$$y = \frac{k}{f} \rightarrow y' = \frac{-kf'}{f^2}$$

$$f = (x-2)^2 \rightarrow f' = 2 \cdot (x-2)^1 \cdot 1 \cdot \left. \right\} \Rightarrow$$

$$y'' = \frac{-(-5) \cdot 2 \cdot (x-2)}{[(x-2)^2]^2} = \frac{10}{(x-2)^3}$$

Nota: la derivada de $y' = \frac{-5}{(x-2)^2}$ se podría haber trabajado como una potencia.

$$y' = -5 \cdot (x-2)^{-2} \rightarrow y'' = -5 \cdot -2 \cdot (x-2)^{-3} = 10 \cdot (x-2)^{-3} = \frac{10}{(x-2)^3}$$



① Recuerda : $y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$

$$y = \frac{x^2 - 1}{x^2 + 1}$$

$$\left. \begin{array}{l} f = x^2 - 1 \rightarrow f' = 2x \\ g = x^2 + 1 \rightarrow g' = 2x \end{array} \right\}$$

$$y' = \frac{2x \cdot (x^2 + 1) - (x^2 - 1) \cdot 2x}{(x^2 + 1)^2} = \frac{2x^3 + 2x - 2x^3 + 2x}{(x^2 + 1)^2}$$

$$\Rightarrow \boxed{y' = \frac{4x}{(x^2 + 1)^2}}$$

$$\left. \begin{array}{l} f = 4x \rightarrow f' = 4 \\ g = (x^2 + 1)^2 \rightarrow g' = 2 \cdot (x^2 + 1)^1 \cdot 2x \end{array} \right\}$$

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

$$= \frac{(x^2 + 1) \cdot [4 \cdot (x^2 + 1) - 16x^2]}{(x^2 + 1)^4}$$

$$= \frac{4x^2 + 4 - 16x^2}{(x^2 + 1)^3}$$

$$\Rightarrow \boxed{y'' = \frac{4 - 12x^2}{(x^2 + 1)^3}}$$



② Recuerda $y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$
 $y = \frac{k}{f} \rightarrow y' = \frac{-k f'}{f^2}$

Preparamos la función

$$y = \frac{16}{x^2 \cdot (x-1)} = \frac{16}{x^3 - x}$$

Es más sencillo derivar la suma $(x^3 - x)$ que el producto $x^2 \cdot (x-1)$.

$$f = x^3 - x \rightarrow f' = 3x^2 - 1$$

$$y' = \frac{-16 \cdot (3x^2 - 1)}{(x^3 - x)^2} = \frac{-48x^2 + 16}{(x^3 - x)^2}$$

$$\left. \begin{aligned} f &= -48x^2 + 16 \rightarrow f' = -96x \\ g &= (x^3 - x)^2 \rightarrow g' = 2 \cdot (x^3 - x)^1 \cdot (3x^2 - 1) \end{aligned} \right\}$$

$$y'' = \frac{-96x \cdot (x^3 - x)^2 - (-48x^2 + 16) \cdot 2 \cdot (x^3 - x) \cdot (3x^2 - 1)}{[(x^3 - x)^2]^2}$$

$$= \frac{(x^3 - x) \cdot [-96x \cdot (x^3 - x) - 2 \cdot (-48x^2 + 16) \cdot (3x^2 - 1)]}{(x^3 - x)^4}$$

$$= \frac{-96x^4 + 96x^2 + 288x^4 - 96x^2 - 96x^2 + 32}{(x^3 - x)^3}$$

$$y'' = \frac{292x^4 - 96x^2 + 32}{(x^3 - x)^3}$$



(m) Recuerda $y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$.

$$y = \frac{x}{x^2-1}$$

$$\left. \begin{array}{l} f = x \longrightarrow f' = 1 \\ g = x^2-1 \longrightarrow g' = 2x \end{array} \right\}$$

$$y' = \frac{1 \cdot (x^2-1) - x \cdot 2x}{(x^2-1)^2} = \frac{x^2-1-2x^2}{(x^2-1)^2} \Rightarrow \boxed{y' = \frac{-1-x^2}{(x^2-1)^2}}$$

$$\left. \begin{array}{l} f = -1-x^2 \longrightarrow f' = -2x \\ g = (x^2-1)^2 \longrightarrow g' = 2 \cdot (x^2-1)^1 \cdot 2x \end{array} \right\}$$

$$y'' = \frac{-2x \cdot (x^2-1)^2 - (-1-x^2) \cdot 2 \cdot (x^2-1) \cdot 2x}{[(x^2-1)^2]^2} =$$

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

$$= \frac{-2x^3 + 2x + 4x + 8x^3}{(x^2-1)^3} \Rightarrow$$

$$\boxed{y'' = \frac{6x^3+6x}{(x^2-1)^3} = \frac{6x \cdot (x^2+1)}{(x^2-1)^3}}$$



② Recuerda $y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$

$$y = \frac{x^2}{x-1}$$

$$\begin{cases} f = x^2 \rightarrow f' = 2x \\ g = x-1 \rightarrow g' = 1 \end{cases}$$

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

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

$$\begin{cases} f = x^2 - 2x \rightarrow f' = 2x - 2 \\ g = (x-1)^2 \rightarrow g' = 2 \cdot (x-1) \end{cases}$$

$$y'' = \frac{(2x-2) \cdot (x-1)^2 - (x^2-2x) \cdot 2 \cdot (x-1)}{[(x-1)^2]^2}$$

$$= \frac{(x-1) \cdot [(2x-2) \cdot (x-1) - 2(x^2-2x)]}{(x-1)^4}$$

$$= \frac{2x^2 - 4x + 2 - 2x^2 + 4x}{(x-1)^3} \Rightarrow$$

$$\boxed{y'' = \frac{2}{(x-1)^3}}$$



$$\textcircled{0} \quad y = \frac{x^2-1}{x} = \frac{x^2}{x} - \frac{1}{x} = x - \frac{1}{x}$$

$$\boxed{y' = 1 - \frac{-1}{x^2} = 1 + \frac{1}{x^2} = \frac{x^2+1}{x^2}}$$

como cociente:

$$\left. \begin{array}{l} f = x^2 - 1 \rightarrow f' = 2x \\ g = x \rightarrow g' = 1 \end{array} \right\}$$

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

Para hacer la 2ª derivada preparemos la 1ª.

$$y' = \frac{x^2+1}{x^2} = 1 + \frac{1}{x^2}$$

$$\boxed{y'' = -2x^{-3} = \frac{-2}{x^3}}$$

Como cociente:

$$\left. \begin{array}{l} f = x^2 + 1 \rightarrow f' = 2x \\ g = x^2 \rightarrow g' = 2x \end{array} \right\}$$

$$y'' = \frac{2x \cdot x^2 - (x^2 + 1) \cdot 2x}{(x^2)^2} = \frac{2x^3 - 2x^3 - 2x}{x^4} = \frac{-2x}{x^4} = \frac{-2}{x^3}$$



① Recuerda $y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$

$$\boxed{y = \frac{x^3}{x^2-1}}$$

$$\left. \begin{array}{l} f = x^3 \rightarrow f' = 3x^2 \\ g = x^2-1 \rightarrow g' = 2x \end{array} \right\}$$

$$y' = \frac{3x^2 \cdot (x^2-1) - x^3 \cdot 2x}{(x^2-1)^2} = \frac{3x^4 - 3x^2 - 2x^4}{(x^2-1)^2}$$

$$\Rightarrow \boxed{y' = \frac{x^4 - 3x^2}{(x^2-1)^2} = \frac{x^2 \cdot (x^2-3)}{(x^2-1)^2}}$$

$$\left. \begin{array}{l} f = x^4 - 3x^2 \rightarrow f' = 4x^3 - 6x \\ g = (x^2-1)^2 \rightarrow g' = 2 \cdot (x^2-1)^1 \cdot 2x \end{array} \right\}$$

$$y'' = \frac{(4x^3 - 6x) \cdot (x^2-1)^2 - (x^4 - 3x^2) \cdot 2 \cdot (x^2-1) \cdot 2x}{[(x^2-1)^2]^2}$$

$$= \frac{(x^2-1) \cdot [(4x^3 - 6x) \cdot (x^2-1) - 4x \cdot (x^4 - 3x^2)]}{(x^2-1)^4}$$

$$= \frac{4x^5 - 4x^3 - 6x^3 + 6x - 4x^5 + 12x^3}{(x^2-1)^3}$$

$$\Rightarrow \boxed{y'' = \frac{2x^3 + 6x}{(x^2-1)^3} = \frac{2x \cdot (x^2+3)}{(x^2-1)^3}}$$



⑨ Recuerda $y = \frac{f}{g} \rightarrow y' = \frac{f' \cdot g - f \cdot g'}{g^2}$

$$y = \frac{x^2 - 6x + 5}{x - 3}$$

$$\begin{cases} f = x^2 - 6x + 5 \rightarrow f' = 2x - 6 \\ g = x - 3 \rightarrow g' = 1 \end{cases}$$

$$y' = \frac{(2x - 6)(x - 3) - (x^2 - 6x + 5) \cdot 1}{(x - 3)^2} = \frac{2x^2 - 6x - 6x + 18 - x^2 + 6x - 5}{(x - 3)^2}$$

$$y' = \frac{x^2 - 6x + 13}{(x - 3)^2}$$

$$\begin{cases} f = x^2 - 6x + 13 \rightarrow f' = 2x - 6 \\ g = (x - 3)^2 \rightarrow g' = 2 \cdot (x - 3)^1 \cdot 1 \end{cases}$$

$$y'' = \frac{(2x - 6) \cdot (x - 3)^2 - (x^2 - 6x + 13) \cdot 2 \cdot (x - 3)}{[(x - 3)^2]^2}$$

$$= \frac{(x - 3) \cdot [(2x - 6) \cdot (x - 3) - 2 \cdot (x^2 - 6x + 13)]}{(x - 3)^4}$$

$$= \frac{2x^2 - 6x - 6x + 18 - 2x^2 + 12x - 26}{(x - 3)^3}$$

$$\Rightarrow y'' = \frac{-8}{(x - 3)^3}$$



$$\begin{aligned}\textcircled{r} \quad f(x) &= x^4 - 6x^2 \\ f'(x) &= 4x^3 - 12x \\ f''(x) &= 12x^2 - 12\end{aligned}$$

$$\begin{aligned}\textcircled{s} \quad f(x) &= -x^3 + 6x^2 - 9x + 8 \\ f'(x) &= -3x^2 + 12x - 9 \\ f''(x) &= -6x + 12\end{aligned}$$

$$\textcircled{t} \quad f(x) = (x^5 - 3x^2)^3 \cdot (2 - 5x^3)^4 \cdot (4x + 7x^3)^6$$

Sólo haré la 1ª derivada (al verla te podrás imaginar la razón de NO hacer la 2ª).

RECUERDA.

$$y = f \cdot g \cdot h \rightarrow y' = f' \cdot g \cdot h + f \cdot g' \cdot h + f \cdot g \cdot h'$$

$$y = f^n \rightarrow y' = n \cdot f^{n-1} \cdot f'$$

$$\begin{aligned}f'(x) &= \boxed{3 \cdot (x^5 - 3x^2)^2 \cdot (5x^4 - 6x)} \cdot (2 - 5x^3)^4 \cdot (4x + 7x^3)^6 + \\ &\quad (x^5 - 3x^2)^3 \cdot \boxed{4 \cdot (2 - 5x^3)^3 \cdot (-15x^2)} \cdot (4x + 7x^3)^6 + \\ &\quad (x^5 - 3x^2)^3 \cdot (2 - 5x^3)^4 \cdot \boxed{6 \cdot (4x + 7x^3)^5 \cdot (4 + 21x^2)}.\end{aligned}$$