

Lista de Regras de Derivadas - Semana 3

a) $y = x^4 + 3x^3 + 2x^2 + x - 3$

$$y' = 4x^3 + 3 \cdot 3x^2 + 2 \cdot 2x + 1$$

$$y' = 4x^3 + 9x^2 + 4x + 1$$

b) $y = \sqrt{x} + \sqrt[3]{x}$

$$y' = x^{1/2} + x^{1/3}$$

$$= \frac{1}{2} x^{-1/2} + \frac{1}{3} x^{-2/3}$$

$$= \frac{1}{2x^{1/2}} + \frac{1}{3x^{2/3}}$$

$$= \frac{1}{2\sqrt{x}} + \frac{1}{3\sqrt[3]{x^2}}$$

c) $y = \frac{1}{x} + \frac{1}{x^2} - \frac{1}{x^3}$

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

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

$$= \frac{2x^4 + x^3 - 3x^4 - 3x^3 + 3x^2}{x^6}$$

$$= \frac{-x^4 - 2x^3 + 3x^2}{x^6}$$

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

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

d) $y = \frac{x^3 + 2}{\sqrt{x}}$

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

$$= \frac{3x^2\sqrt{x} - \frac{x^3 + 2}{2\sqrt{x}}}{x}$$

$$= \frac{5x^3 - 2}{2\sqrt{x}}$$

$$= \frac{5x^3 - 2}{2x\sqrt{2}}$$

e) $y = \sqrt{x}(x^4 + x)$

$$y' = (\sqrt{x})(4x^3 + 1) + \left(\frac{1}{2\sqrt{x}}\right)(x^4 + x)$$

$$= 4x^3\sqrt{x} + \sqrt{x} + \frac{x^4 + x}{2\sqrt{x}}$$

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

$$= 4x^3\sqrt{x} + \sqrt{x} + \frac{x^3\sqrt{x} + \sqrt{x}}{2}$$

$$= 8x^3\sqrt{x} + 2\sqrt{x} + x^3\sqrt{x} + \sqrt{x}$$

$$= 9x^3\sqrt{x} + 2\sqrt{x} + \sqrt{x}$$

$$= \frac{9x^3\sqrt{x} + 3\sqrt{x}}{2}$$

f) $y = (x^2 - 4)(x + 2x^4)$

$$y' = (x^2 - 4)(1 + 8x^3) + (2x)(x + 2x^4)$$

$$= x^2 + 8x^5 - 4 - 32x^3 + 2x^2 + 4x^5$$

$$= 3x^2 + 12x^5 - 4 - 32x^3$$

$$= 12x^5 - 32x^3 + 3x^2 - 4$$

g) $y = 7 \cdot (ax^2 + bx + c)$

$$y' = 7 \cdot (2ax + b) + 0 \cdot (ax^2 + bx + c)$$

$$= 7 \cdot (2ax + b)$$

h) $y = \frac{15}{2 + x + x^2}$

$$y' = \frac{(2 + x + x^2)(0) - (15)(1 + 2x)}{(2 + x + x^2)^2}$$

$$= \frac{-15 - 30x}{(2 + x + x^2)^2}$$

$$= \frac{15(2x + 1)}{(2 + x + x^2)^2}$$

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

$$y' = \frac{(x\sqrt{1+x^2})(4x) - (2x^2-1)\left(\frac{2x^2+1}{\sqrt{1+x^2}}\right)}{(x\sqrt{1+x^2})^2}$$

$$= \frac{4x^2\sqrt{1+x^2} + \frac{1-4x^4}{\sqrt{1+x^2}}}{x^2 + x^4}$$

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

$$= \frac{4x^2 + \frac{1}{\sqrt{1+x^2}}}{x^2 + x^4}$$

$$= \frac{4x^2 + 1}{\sqrt{1+x^2}} \cdot \frac{1}{x^2 + x^4}$$

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

$$j) y = \frac{3x^2 + 5x - 1}{x - 1}$$

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

$$= \frac{6x^2 + 5x - 6x - 5 - 3x^2 - 5x + 1}{x^2 - 2x + 1}$$

$$= \frac{3x^2 - 6x - 4}{x^2 - 2x + 1}$$