

Regra da Potência

$$1) a) f'(x) = 10 \cdot (3x+5)^9 \cdot 3 = 30(3x+5)^9$$

$$b) f'(x) = 5 \cdot (x^2-2x+6)^4 \cdot (2x-2) = (10x-10)(x^2-2x+6)^4$$

$$c) f'(x) = \frac{-3}{(x+5)^4}$$

$$d) g'(x) = 17000 (17x-5)^{999}$$

$$e) g'(x) = 3 \left(x^4 + 5x + \frac{1}{6x} \right)^2 \cdot \left(4x^3 + 5 - \frac{1}{6x^2} \right)$$

$$f) g'(x) = [(x^2+1)^2]' [x^3-2x]^2 + [(x^2+1)^2] [x^3-2x]^2'$$

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

$$g'(x) = (x^2+1) \cdot (x^3-2x) \cdot [4x(x^3-2x) + 2(x^2+1)(3x^2-2)]$$

$$[(x^2+1)^2]' = 2u \cdot u' = 2 \cdot (x^2+1) \cdot 2x = 4x(x^2+1)$$

$$[(x^3-2x)^2]' = 2u \cdot u' = 2 \cdot (x^3-2x) \cdot (3x^2-2)$$

$$g) h'(x) = [(x^3+2x-6)^3]' \cdot (x^2-4x+5)^7 + (x^3+2x-6)^3 \cdot [(x^2-4x+5)^7]'$$

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

$$h) h'(x) = \frac{1 \cdot (x^2-1)^4 - x \cdot 4(x^2-1)^3 \cdot 2x}{(x^2-1)^8} = \frac{(x^2-1)^4 - 8x^2(x^2-1)^3}{(x^2-1)^8}$$

$$= \frac{\cancel{(x^2-1)^3} \cdot [(x^2-1) - 8x^2]}{(x^2-1)^{8-3}} = \frac{x^2-1-8x^2}{(x^2-1)^5} = \frac{-7x^2-1}{(x^2-1)^5}$$

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

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

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

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

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

$$j) f'(x) = \frac{\left(7 - \frac{1}{x^2}\right)(x^2+2x-1) - \left(7x + \frac{1}{x}\right)(2x+2)}{(x^2+2x-1)^2}$$

$$k) \frac{[(4x-1)^3 \cdot (x^2+2)^4]' (3x^2+5)^2 - (4x-1)^3 (x^2+2)^4 \cdot 2(3x^2+5) \cdot 6x}{(3x^2+5)^4}$$

$$f'(x) = \frac{[12(4x-1)^2 \cdot (x^2+2)^4 + 8x(4x-1)^3(x^2+2)^3] (3x^2+5)^2 - (4x-1)^3 (x^2+2)^4 \cdot 12x(3x^2+5)}{(3x^2+5)^4}$$

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

$$= 12(4x-1)^2 \cdot (x^2+2)^4 + 8x(4x-1)^3 \cdot (x^2+2)^3$$

$$l) f'(x) = [(x+1)^{2/3}]' \sqrt{x-1} + \sqrt[3]{x+1}^2 \cdot [(x-1)^{1/2}]'$$

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

$$m) g'(x) = 8 \left(\sqrt{5x} + \frac{1}{\sqrt[3]{x^2}} + \sqrt{\pi} \right)' \cdot \left(\frac{\sqrt{5}}{2\sqrt{x}} - \frac{2}{3\sqrt[3]{x^3}} \right)$$

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

$$g'(x) = \frac{6x+9-6x+4}{2\sqrt{\frac{3x-2}{2x+3}}(2x+3)^2} = \frac{13}{2\sqrt{3x-2}\sqrt{2x+3}(2x+3)^2}$$

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