Regla producto y división

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DERIVACIÓN / REGLAS DE DERIVACIÓN

POTENCIAL $f(x) = k \cdot x^{a} \longrightarrow f'(x) = k \cdot a \cdot x^{a-1}$

$$f(x) = 5 \cdot \sqrt[3]{x} = 5x^{1/3} \qquad f'(x) = 5 \frac{1}{3} x^{1/3 - 1} =$$

$$= 5 \quad {}^{-2/3} =$$

$$f'(x) = \boxed{\frac{3}{5\sqrt[3]{x^2}}}$$

RECTA TG f EN $x_0 = 1$

$$y - f(x_0) = f'(x_0)(x - x_0)$$

$$y - f(1) = f'(1)(x-1)$$

$$y - 5\sqrt[3]{1} = \frac{3}{5\sqrt[3]{1^2}}(x-1) \qquad \boxed{y - 5 = \frac{3}{5}(x-1)}$$

$$g(x) = \underbrace{5\sqrt[3]{x}} + \underbrace{3x^2}$$

$$g'(x) = \frac{5}{3\sqrt[3]{x^2}} + 6x$$

¿Funciona esta regla con el producto?
la división

$$h(x) = (5\sqrt[3]{x}) \cdot (3x^2)$$

$$\cancel{h'(x) = \frac{5}{3\sqrt[3]{x^2}} \cdot 6x}$$

$$\cancel{d(x) = \frac{(5\sqrt[3]{x})}{(3x^2)}}$$

$$\cancel{d'(x) = \frac{\frac{5}{3\sqrt[3]{x^2}}}{6x}}$$

$\cancel{3\sqrt[3]{x^2}}$

$\cancel{\dfrac{\dots}{6x}}$

Reglas de Derivación

· Regla del producto

$h(x) = \underbrace{\left(5\sqrt[3]{x}\right)}_{f(x)} \cdot \underbrace{\left(3x^2\right)}_{g(x)}$

$h'(x) = \left(5\sqrt[3]{x}\right)' \cdot \left(3x^2\right) + \left(5\sqrt[3]{x}\right) \cdot \left(3x^2\right)' =$

$= \boxed{\left(\dfrac{5}{3\sqrt[3]{x^2}}\right)} \cdot \boxed{\left(3x^2\right)} + \boxed{\left(5\sqrt[3]{x}\right)} \cdot \boxed{\left(6x\right)} =$ Álgebra

$$h'(x) = \frac{15x^2}{3\sqrt[3]{x^2}} + 5\sqrt[3]{x} \cdot 6x = \boxed{\frac{5x^2}{\sqrt[3]{x^2}} + 30x\sqrt[3]{x}}$$

$$\left[f(x) \cdot g(x)\right]' = f'(x)\,g(x) + f(x)\,g'(x)$$

$r(x) = \left(3x^5+2x\right) \cdot \left(x^3-8x^2\right)$

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$r'(x) = \left(3x^5+2x\right)'\left(x^3-8x^2\right) + \left(3x^5+2x\right)\left(x^3-8x^2\right)' =$

$= \left(15x^4+2\right)\left(x^3-8x^2\right) + \left(3x^5+2x\right)\left(3x^2-16x\right) =$

$=$ (OPERAR) $=$ [Pol. grado 7] $=$

$=$

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

Regla del cociente

$h(x) = \dfrac{x^2-x}{x^3+2}$ NO $\Rightarrow$ $\cancel{h'(x) = \dfrac{\left(x^2-x\right)'}{\left(x^3+2\right)'}}$

der. denominador

$h'(x) = \left(x^2-x\right)'\left(x^3+2\right) - \left(x^2-x\right)\left(x^3+2\right)'$

d.g. denominador

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

NO SE OPERA

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

Álgebra

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

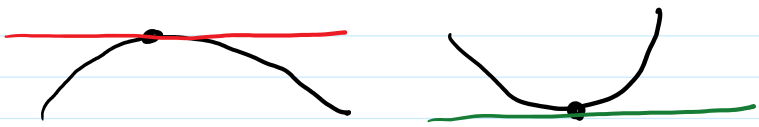
$$=\frac{2x^4+4x-x^3-2-3x^4+3x^3}{(x^3+2)^2}=$$

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

$$\left[\frac{f(x)}{g(x)}\right]'=\frac{f'(x)g(x)-f(x)g'(x)}{g(x)^2}$$

ESTUDIAR $h(x)=\dfrac{x^2-x}{x^3+2}$

¿Dónde puede tener/alcanzar la función h su MAX/min RELATIVOS?



$$h'(x)=0 \iff \frac{-x^4+2x^3+4x-2}{(x^3+2)^2}=0 \iff$$

$\Leftrightarrow \quad -x^4+2x^3+4x-2=0$ (resolver)