DERIVATE

14 dic 2020

$D[K \cdot f(x)]$

$$D[K \cdot f(x)] = \lim_{h \to 0} \frac{K \cdot f(x+h) - K \cdot f(x)}{h} = K \cdot \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} =$$

$$= K \cdot f'(x) \quad \square$$

$D[f(x) + g(x)]$

$D[f(x) + g(x)] =$ sia $h(x) = f(x) + g(x)$

$$= \lim_{h \to 0} \frac{h(x+h) - h(x)}{h} = \lim_{h \to 0} \frac{f(x+h) + g(x+h) - f(x) - g(x)}{h} =$$

$$= \lim_{h \to 0} \left[\underbrace{\frac{f(x+h) - f(x)}{h}}_{\to f'(x)} + \underbrace{\frac{g(x+h) - g(x)}{h}}_{\to g'(x)} \right] = f'(x) + g'(x) \quad \square$$

$D[f(x) \cdot g(x)]$

$$D[f(x) \cdot g(x)] = \lim_{h \to 0} \frac{f(x+h) \cdot g(x+h) - f(x) \cdot g(x)}{h} =$$

$$= \lim_{h \to 0} \frac{f(x+h) \cdot g(x+h) - f(x) \cdot g(x+h) + f(x) \cdot g(x+h) - f(x) g(x)}{h} =$$

$$= \lim_{h \to 0} \left[g(x+h) \frac{f(x+h) - f(x)}{h} + f(x) \frac{g(x+h) - g(x)}{h} \right] =$$

$$= f'(x) g(x) + g'(x) \cdot f(x) \quad \square$$

$D\left[\dfrac{1}{f(x)}\right]$

$$y' = \lim_{h \to 0} \frac{1/f(x+h) - 1/f(x)}{h} = \lim_{h \to 0} \left[\frac{1}{h} \cdot \frac{f(x) - f(x+h)}{f(x+h) \cdot f(x)} \right] =$$

$$= \lim_{h \to 0} \left[\frac{f(x) - f(x+h)}{h} \cdot \frac{1}{f(x+h)\, f(x)} \right] = -\frac{f'(x)}{f^2(x)} \quad \square$$

$D[f(x)/g(x)]$

$$y = D\left[f(x) \cdot \frac{1}{g(x)} \right] = D[f(x)] \cdot \frac{1}{g(x)} + D\left[\frac{1}{g(x)}\right] \cdot f(x) =$$

$$= \frac{f'(x)}{g(x)} - \frac{g'(x)}{g^2(x)} \cdot f(x) = \frac{f'(x) \cdot g(x) - f(x)\, g'(x)}{g^2(x)} \quad \square$$

$D[\tan x]$

$$D(\tan x) = D\, \frac{\operatorname{sen} x}{\cos x} = \frac{D(\operatorname{sen} x) \cos x - \operatorname{sen} x\, D(\cos x)}{\cos^2 x} =$$

$$= \frac{\cos^2 x + \operatorname{sen}^2 x}{\cos^2 x} = \frac{1}{\cos^2 x} = 1 + \tan^2 x \quad \square$$

$D[\cot x]$

$$y' = D\left[\frac{1}{\tan x}\right] = -\frac{1}{\cos^2 x \cdot \tan^2 x} = -\frac{1}{\operatorname{sen}^2 x} = -1 - \tan^2 x \quad \square$$