Derivate

16 dic 2020

Derivata di funzioni composte

$$f \circ g(x) \Rightarrow x \to g(x) \to \underbrace{f[g(x)]}$$

da preferire

come la deriviamo?

ex $y = \operatorname{sen}(2x+1)$

$$x \longmapsto 2x+1 \longmapsto \operatorname{sen} f(x)$$

per derivare faccio il processo contrario

$Df(x)$ $\quad$ $D\operatorname{sen} f(x)$

$$y' = D[\operatorname{sen} f(x)] \cdot D[f(x)] = \cos(2x+1) \cdot D(2x+1) = 2\cos(2x+1)$$

Formula sia $y = f[g(x)] \to y' = f'[g(x)] \cdot g'(x)$

ex

$$y = \ln[\tan x] \longrightarrow y' = \frac{1}{\tan x}\left(\frac{1}{\cos^2 x}\right) = \frac{1}{\operatorname{sen} x \cos x} = \frac{2}{\operatorname{sen} 2x}$$

$$y = \ln \cos x \longrightarrow y' = \frac{1}{\cos x} \cdot (-\operatorname{sen} x) = -\tan x$$

$$y = \ln \tan \frac{x}{2} \longrightarrow y' = \frac{1}{\tan x/2} \cdot \frac{1}{\cos^2 x/2} \cdot 1/2 = \frac{1}{\operatorname{sen} x}$$

$$y = x \ln^3 x \to y' = D(x) \cdot \ln^3 x + x D(\ln^3 x) =$$
$$= \ln^3 x + x(3\ln^2 x \cdot 1/x) =$$
$$= \ln^3 x + 3\ln^2 x = \ln^2 x(\ln x + 3)$$

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- $y = \sqrt[3]{3x+1} = (3x+1)^{1/3} \longrightarrow y' = \frac{1}{3}(3x+1)^{-2/3} \cdot 3 = \frac{1}{\sqrt[3]{(3x+1)^2}}$
- $y = [\ln x + 1]^8 = 8(\ln x + 1)^7 (1/x) = 8/x \, [\ln x + 1]^7$

esercizi p. 1607