3Blue1Brown - Anotações

27 de junho de 2024 17:53

$$\frac{s(t+dt) - s(t)}{dt}$$

Chapter 2:

$dt = 0.01$, for exemple

na realidade.

Em "pure math":

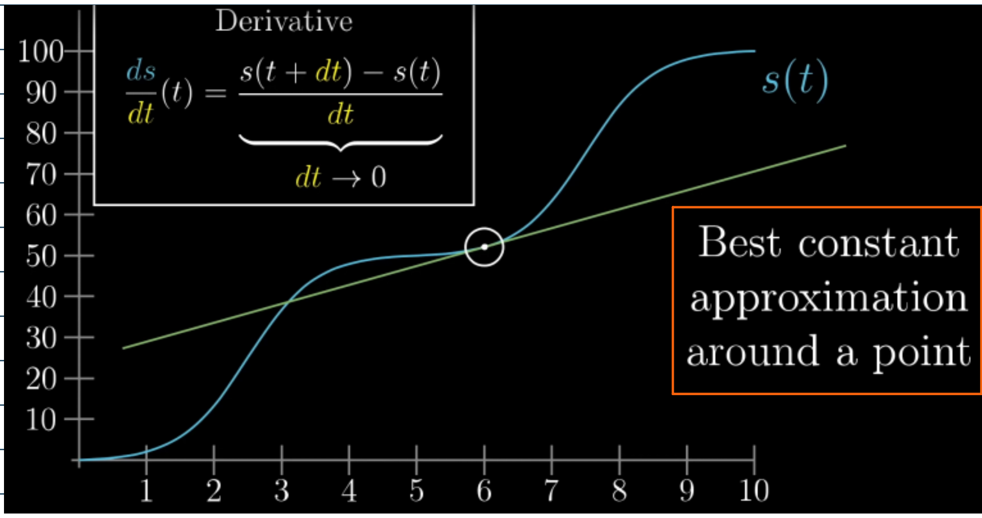
$$\frac{s(t + 0.00...0001) - s(t)}{0.00...0001}$$

approaches 0

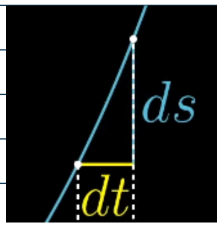
$dt \to 0$

$\Leftrightarrow$ declive da tangente num ponto de $s(t)$

dt is not "infinitely small"
dt is not 0
it just approaches 0



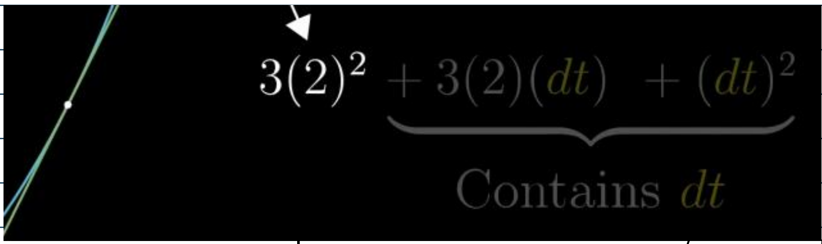
$s(t) = t^3$



$$\frac{ds}{dt}(2) = \frac{s(2+dt) - s(2)}{dt}$$

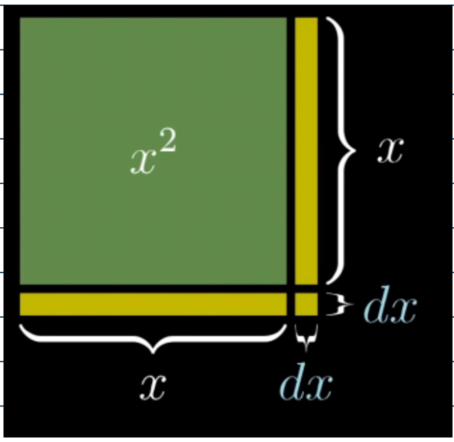
$$= \frac{(2+dt)^3 - 2^3}{dt}$$

$$\frac{\text{tiny changes in distance}}{\text{tiny changes in time}}$$



$3xt^2$ ↳ approaches 0

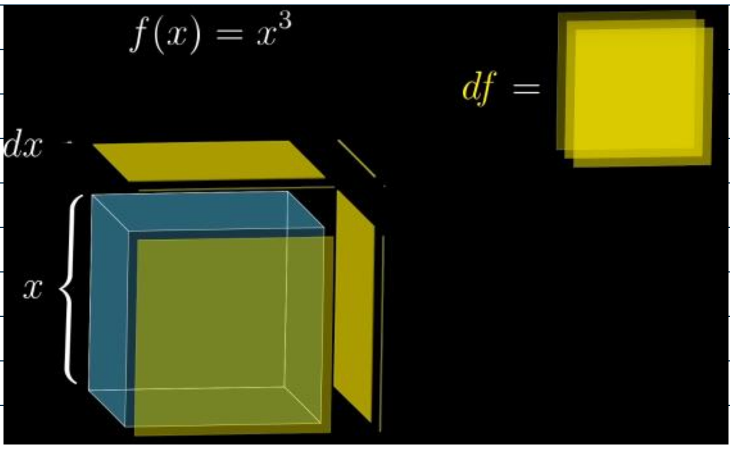
Chapter 3



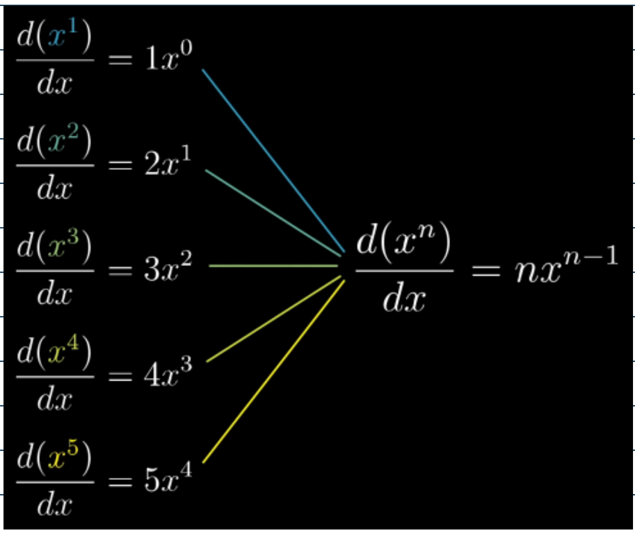
$2 \times (x\,dx) + \underbrace{dx^2}$

↳ negligibly tiny

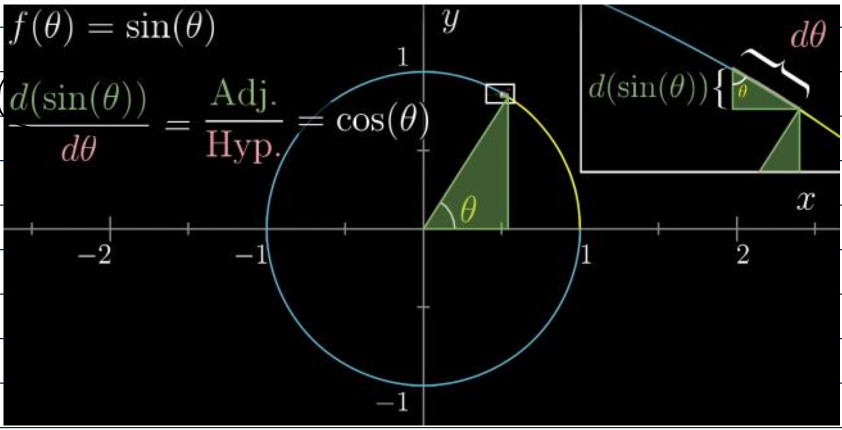
$\Rightarrow \dfrac{df}{dx} = 2x$

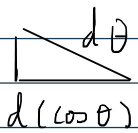


$\rightarrow 3x\,dx$



"Power rule"

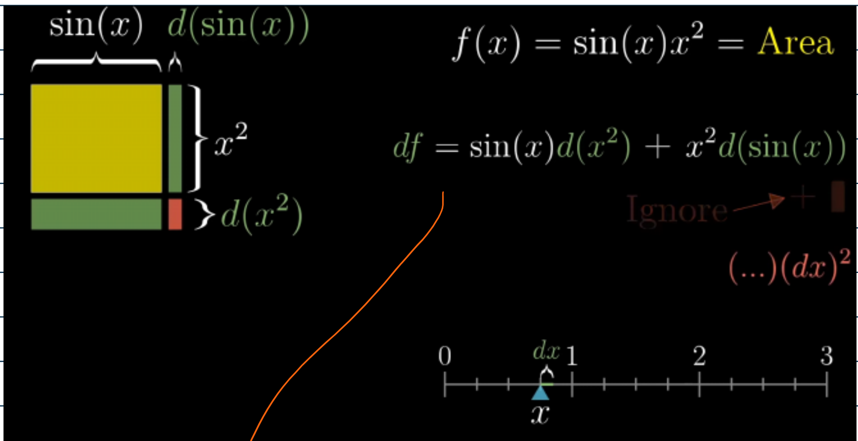




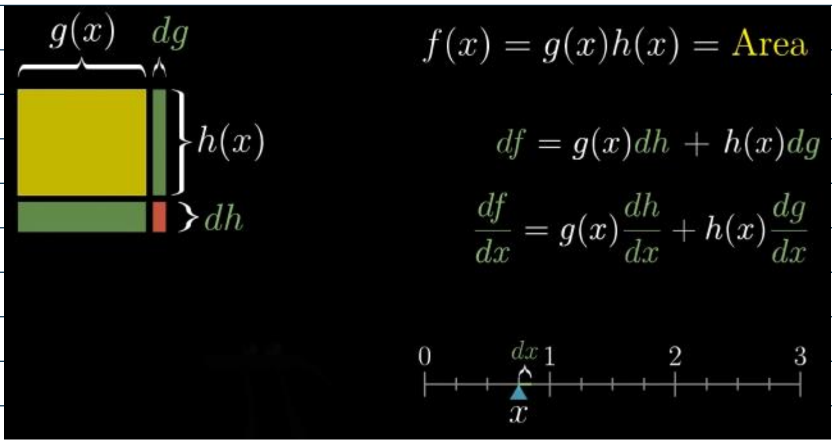
$$\frac{d(\cos\theta)}{d\theta} = -\frac{Op}{hyp} = -sen(\theta) \ ?$$

Chapter 4

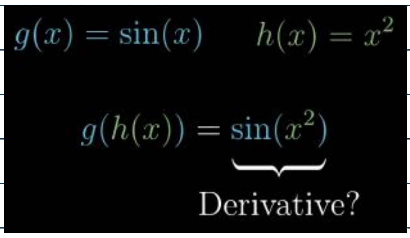
↳ Regra da cadeia e Regra do produto

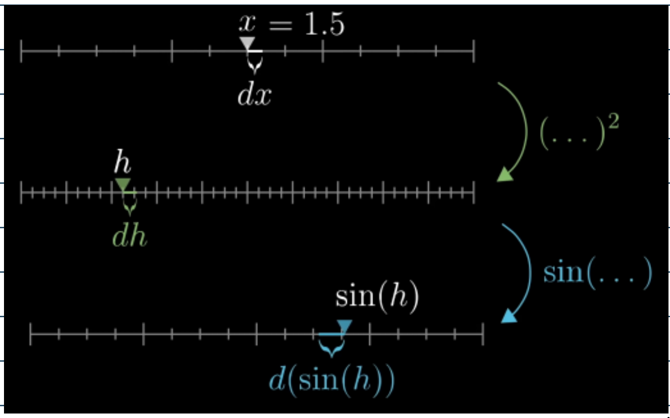


$$\frac{df}{dx} = \sin x \, 2x + x^2 \cos(x)$$



FUNCTION COMPOSITION





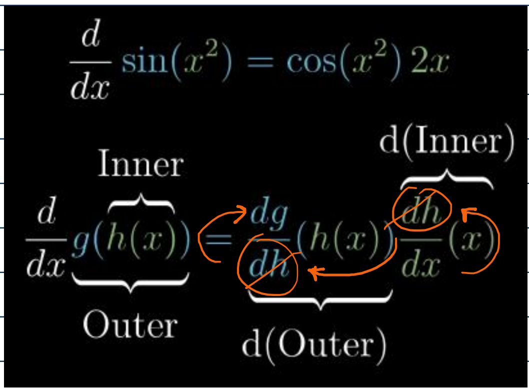
$h = x^2$

$\hookrightarrow d(\sin(x^2)) = \cos(x^2)\, d(x^2)$

$= \cos(x^2)\, 2x\, dx$

$\Leftrightarrow \frac{d(\sin(x^2))}{dx} = \cos(x^2)\, 2x$

$\hookrightarrow$ CHAIN RULE

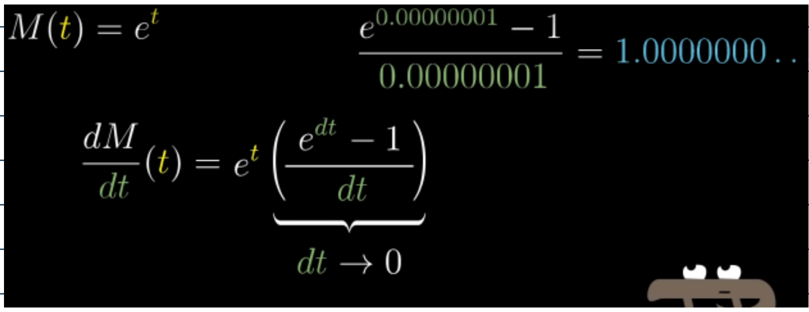


$= \frac{dg}{dx}$

Chapter 5

All exponential functions are proportionals to their own derivative

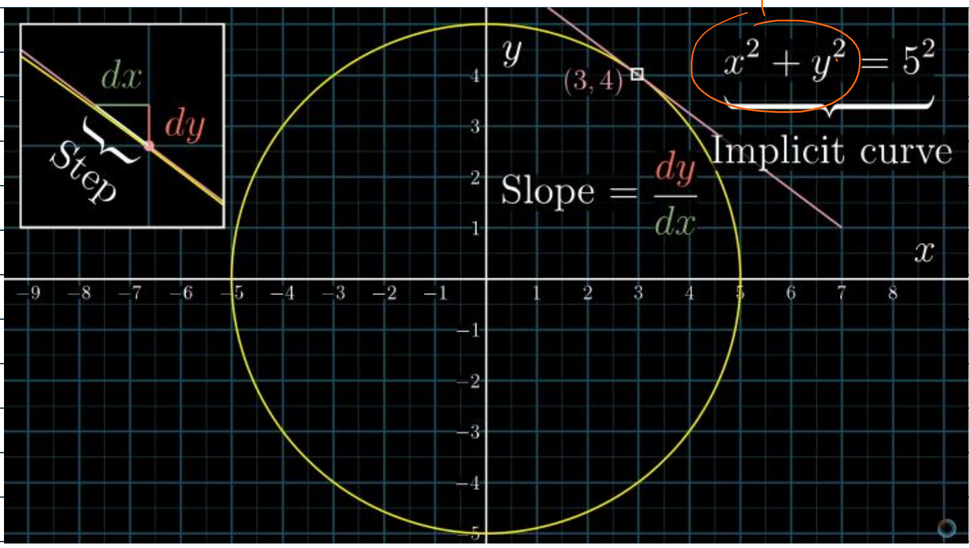
But e has a proportionality constant = 1



$2^t = e^{\ln(2)t}$

Chapter 6 : Diferenciação Implícita

Variáveis interdependentes ≠ Função

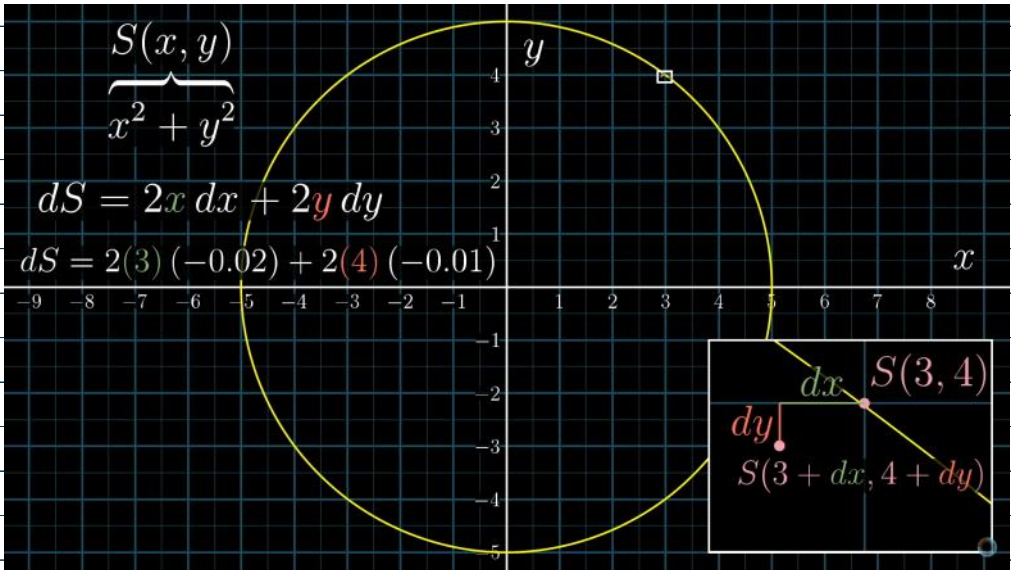


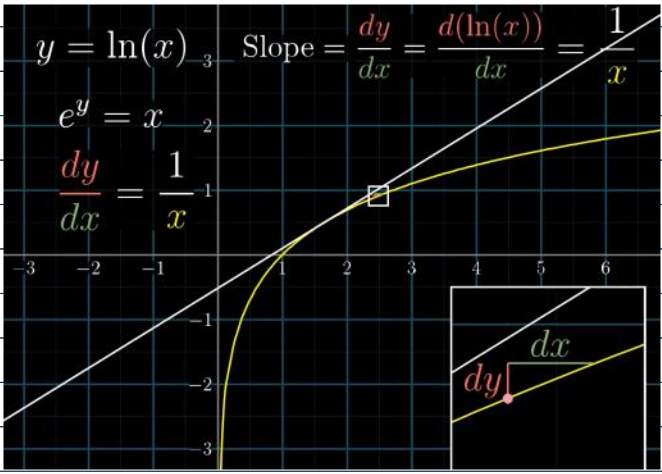
$$2x\,dx + 2y\,dx = 0$$

$$\implies \frac{dy}{dx} = \frac{-x}{y}$$

↓

implicit differentiation

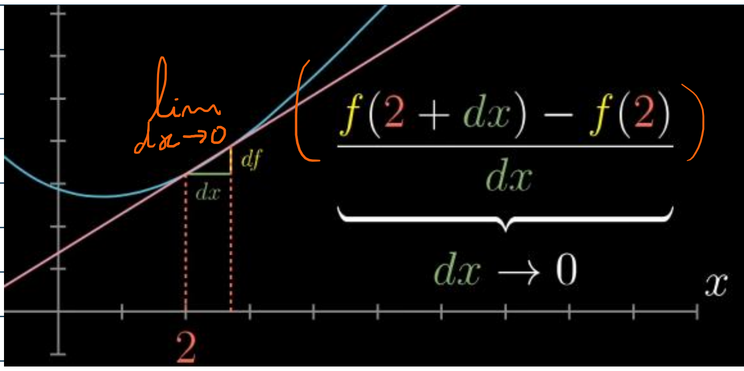




Capítulo 7: Limites, regra de L'Hôpital e definições de δ, ε

"Calculus required continuity, and continuity was supposed to require the infinitely little; but nobody could discover what the infinitely little might be."

\- Bertrand Russel



How to compute limits?

$$\lim_{x \to 0} \frac{1 - \cos(2x)}{tg\,x} \qquad sen^2 = 1 - \cos^2 x$$

$$\frac{1 - (\cos^2 x - sen^2 x)}{\frac{sen\,x}{\cos x}}$$

$$= \frac{1 - \cos^2 x + sen^2 x}{\frac{sen\,x}{\cos x}} = \frac{2 sen^2 x \cos x}{sen\,x}$$

$$= 2\,sen\,x \cos x$$

$$= sen(2x)$$

$$= sen(0)$$

$$= 0$$

ou

usar a regra de L'Hôpital

—//—

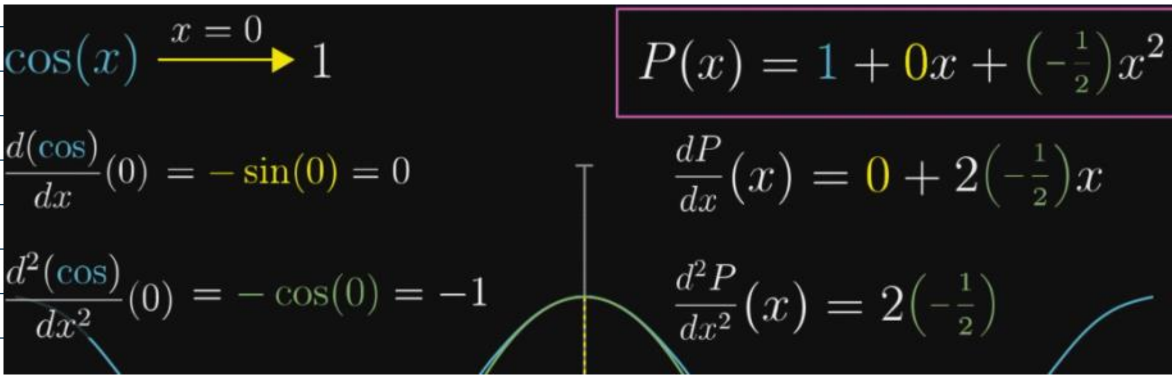
TAYLOR SERIES

Non polinomial function ~~~~> Polinomial function

easier to deal with

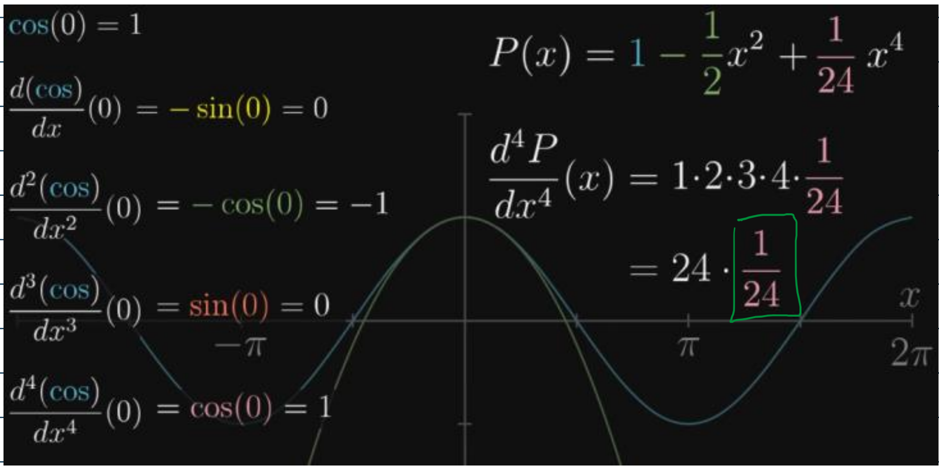
Near $x = 0$

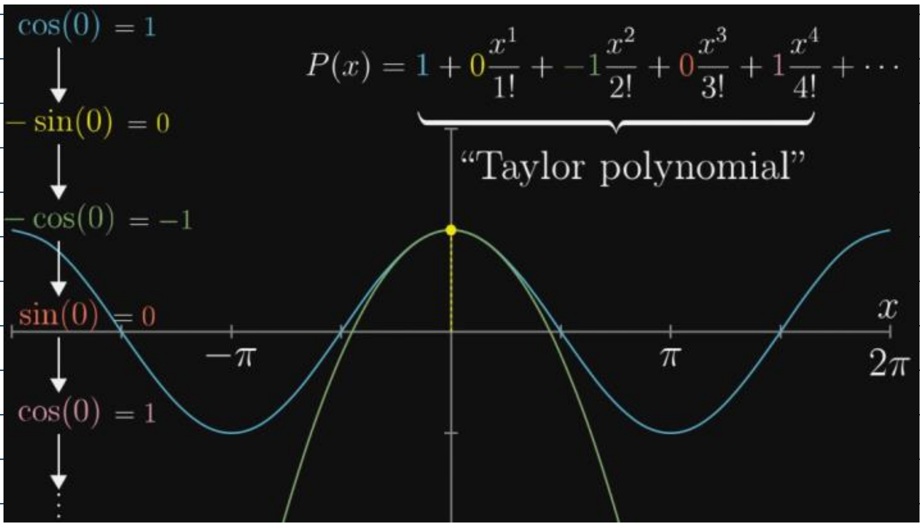
$$e^x \approx 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3$$



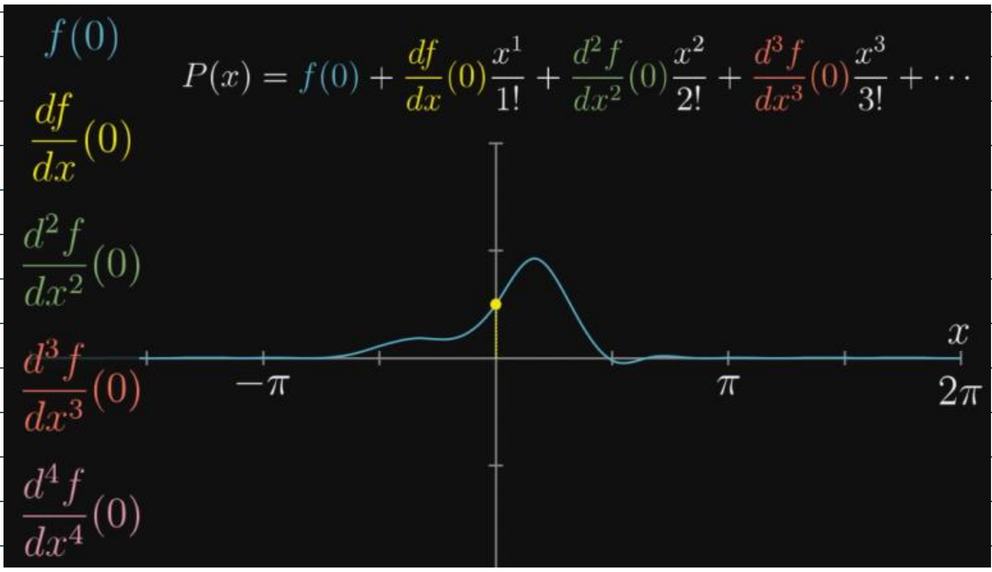
Encontrar m, em m * x, para que o valor da segunda derivada seja igual à segunda derivada da função que se quer aproximar

Melhoria:





VERSÃO GENÉRICA:



$f(0)$
$\frac{df}{dx}(0)$
$\frac{d^2 f}{dx^2}(0)$
$\frac{d^3 f}{dx^3}(0)$
$\frac{d^4 f}{dx^4}(0)$
$P(x) = f(0) + \frac{df}{dx}(0)\frac{x^1}{1!} + \frac{d^2 f}{dx^2}(0)\frac{x^2}{2!} + \frac{d^3 f}{dx^3}(0)\frac{x^3}{3!} + \cdots$
x
$-\pi$
π
2π