$$\frac{\cos(5x)}{\operatorname{sen}(2x)} \xrightarrow[\text{quociente}]{\text{derivado}} \frac{a' \times b - b' \cdot a}{b^2}$$

$$\# \; a = \cos(5x) \xRightarrow{d} \begin{matrix} f_e = \cos(u) \\ f_i = 5x \end{matrix} \Rightarrow \begin{matrix} f_e' = -\operatorname{sen}(u) \\ f_i' = 5 \end{matrix}$$

$$a' = f_i' \times f_e' = 5 \times (-\operatorname{sen}(u)) = -5\operatorname{sen}(5x)$$

$$\# \; b = \operatorname{sen}(2x) \xRightarrow{d} \begin{matrix} f_e = \operatorname{sen}(u) \\ f_i = 2x \end{matrix} \Rightarrow \begin{matrix} f_e' = \cos(u) \\ f_i' = 2 \end{matrix}$$

$$b' = f_i' \times f_e' = 2 \times \cos(u) = 2\cos(2x)$$

Substituindo

$$\frac{a' \cdot b - b' \cdot a}{b^2} = \frac{[-5\operatorname{sen}(5x)\operatorname{sen}(2x)] - [2\cos(2x) \cdot \cos(5x)]}{\operatorname{sen}^2(2x)}$$

$$= \frac{-5\operatorname{sen}(5x)\operatorname{sen}(2x) - 2\cos(2x)\cos(5x)}{\operatorname{sen}^2(2x)}$$

• $[\sin(3x) + \cos(2x)]^3 \Rightarrow$ regra da cadeia

$$f_e = u^3 \xRightarrow{d} f_e' = 3u^2$$

$$f_i = \text{sen}(3x) + \cos(2x) \xRightarrow{d} f_i' = \underbrace{\overbrace{\text{sen}(3x)'}^{a} + \overbrace{\cos(2x)'}^{b}}_{\text{regra da cadeia}}$$

$a = \text{sen}(3x)$

$$\left.\begin{aligned} f_e &= \text{sen}(u) \xRightarrow{d} f_e' = \cos(u) \\ f_i &= 3x \xRightarrow{d} f_i' = 3 \end{aligned}\right\} \Rightarrow 3\cos(3x)$$

$b = \cos(2x)$

$$\left.\begin{aligned} f_e &= \cos(u) \xRightarrow{d} f_e' = -\text{sen}(u) \\ f_i &= 2x \Rightarrow f_i' = 2 \end{aligned}\right\} -2\,\text{sen}(2x)$$

$3u^2 \times f_i' \Rightarrow 3u^2(3\cos(3x) - 2\,\text{sen}(2x))$

$$\Rightarrow 3(\text{sen}(3x) + \cos(2x))^2(3\cos(3x) - 2\,\text{sen}(2x))$$

$$\underbrace{e^{-2t}}_{a} \times \underbrace{\text{sen}(3t)}_{b} \xRightarrow{\text{derivada multiplicação}} a' \times b + b' \times a$$

\# $a = e^{-2t} \left\} \begin{array}{l} f_e = e^{u} \xRightarrow{d} f_e' = e^{x} \\ f_i = -2t \xRightarrow{d} f_i' = -2 \end{array} \right\} a' = -2 \times e^{-2t}$

\# $b = \text{sen}(3t) \left\} \begin{array}{l} f_e = \text{sen}(u) \xRightarrow{d} f_e' = \cos(u) \\ f_i = 3t \xRightarrow{d} f_i' = 3 \end{array} \right\} b' = 3\cos(3t)$

\# Substituindo em $a' \cdot b + b' \cdot a$

$$(-2e^{-2t}) \cdot \text{sen}(3t) + (3\cos(3t)) \times e^{-2t}$$

$$e^{-2t}(-2\,\text{sen}(3t) + 3\cos(3t))$$

• $\cos^3(x^3)$ Regra da cadeia

$f_e = u^3 \xrightarrow{d} f_e' = 3u^2$

$f_i = \cos(x^3) \xrightarrow{d} f_i' = \cos(x^3)'$ → regra da cadeia

$f_e = \cos(u) \xrightarrow{d} f_e' = -\text{sen}(u)$

$f_i = x^3 \xrightarrow{d} f_i' = 3x^2$

$\Big\} -3x^2\,\text{sen}(x^3)$

Pegando f_e' e f_i'

$f_e' \cdot f_i' = 3u^2 \cdot [-3x^2\,\text{sen}(x^3)] =$

$= 3(\cos(x^3))^2(-3x^2\,\text{sen}(x^3)) = -9x^2\cos^2(x^3)\,\text{sen}(x^3)$

• $\ln\left(x+\sqrt{x^2+1}\right)$ Regra da cadeia

$$f_e = \ln(u) \xrightarrow{d} f_e' = \frac{1}{u}$$

$$f_i = x + \sqrt{x^2+1} \xrightarrow{d} f_i' = x' + \sqrt{x^2+1}'$$ → Regra da cadeia

$$= 1 + \sqrt{x^2+1}'$$

$$f_e = \sqrt{u} = u^{\frac{1}{2}} \xrightarrow{d} f_e' = \frac{1}{2} u^{-\frac{1}{2}} = \frac{1}{2\sqrt{u}}$$

$$f_i = x^2 + 1 \xrightarrow{d} f_i' = 2x$$

$$\Rightarrow f_e' \times f_i' = \frac{2x}{2\sqrt{x^2+1}} \Rightarrow \frac{x}{\sqrt{x^2+1}}$$

\# Pegando o resultado de f_e' e f_i'

$$f_e' \times f_i' = \left(\frac{1}{u}\right) \times \left(1 + \frac{x}{\sqrt{x^2+1}}\right)$$

$$= \left(\frac{1}{x+\sqrt{x^2+1}}\right) \times \left(1 + \frac{x}{\sqrt{x^2+1}}\right)$$