Atividade 01 – Derivadas – Circuitos 3

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(3) $g(x) = (x^3-7).(2x^2+3)$

$g'(x) = (x^3-7)'.(2x^2+3) + (2x^2+3)'.(x^3-7)$

$g'(x) = 3x^2.(2x^2+3) + (4x)(x^3-7)$

$g'(x) = 6x^4 + 9x^2 + 4x^4 - 28x$

$\boxed{g'(x) = 10x^4 + 9x^2 - 28x}$

(4) $f(x) = \dfrac{1}{\sqrt{x^2+2x}} = (x^2+2x)^{-1/2}$

$\boxed{f'(x) = -\frac{1}{2}.(2x+2).(x^2+2x)^{-1/2+1} = -(x+1).\sqrt{x^2+2x}}$

(5) $h(r) = r^2(3r^4-7r+2) = 3r^6 - 7r^3 + 2r^2$

$\boxed{h'(r) = 18r^5 - 21r^2 + 4r}$

(6) $f(x) = \ln(x^2+x+1)$

$\boxed{f'(x) = \dfrac{1}{x^2+x+1}.(2x+1) = \dfrac{2x+1}{x^2+x+1}}$

(7) $f(x) = \sqrt{\operatorname{cossec}(x)} = (\cos^{-1}(x))^{1/2} = [\cos(x)]^{-1/2}$

$\boxed{f'(x) = -\frac{1}{2}.(-\operatorname{sen} x).(\cos x)^{-1/2+1} = \dfrac{\operatorname{sen} x.\sqrt{\cos x}}{2}}$

(9) $g(z) = \frac{(8 - z + 3z^2)}{2 - 9z}$

$$g'(z) = \frac{(8 - z + 3z^2)' \cdot (2 - 9z) - (2 - 9z)' \cdot (8 - z + 3z^2)}{(2 - 9z)^2}$$

$$g'(z) = \frac{(-1 + 6z) \cdot (2 - 9z) - (-9) \cdot (8 - z + 3z^2)}{(2 - 9z)^2}$$

$$g'(z) = \frac{(-2 + \cancel{9z} + 12z - 54z^2) + (72 - \cancel{9z} + 27z^2)}{(2 - 9z)^2}$$

$$\therefore \boxed{g'(z) = \frac{-27z^2 + 12z + 70}{(2 - 9z)^2}}$$

$$\begin{array}{r} 54 \\ -27 \\ \hline 27 \end{array}$$

(8) $f(x) = \ln^3 x$

$$f'(x) = \frac{1}{x} \cdot 3 \cdot \ln^2 x \Rightarrow \boxed{f'(x) = \frac{3\ln^2 x}{x}}$$

(10) $f(x) = \ln(x^3)$

$$f'(x) = 3x^2 \cdot \frac{1}{x^3} \Rightarrow \boxed{f'(x) = \frac{3}{x}}$$

(11) $f(t) = t^5 + \left(\frac{t+1}{t^2}\right)$

$$f'(t) = 5t^4 + \frac{(t+1)' \cdot t^2 - (t^2)' \cdot (t+1)}{t^4}$$

$$f'(t) = 5t^4 + \frac{t^2 - 2t(t+1)}{t^4}$$

$$f'(t) = 5t^4 + \frac{t - 2(t+1)}{t^3} = 5t^4 + \frac{t - 2t + 1}{t^3}$$

$$\boxed{f'(t) = \frac{5t^7 - t + 1}{t^3}}$$

(12) $f(x) = (\ln x) \cdot (\operatorname{sen} x)$

$$f'(x) = (\ln x)' \cdot \operatorname{sen} x + (\operatorname{sen} x)' \cdot \ln x$$

$$\boxed{f'(x) = \frac{\operatorname{sen} x}{x} + \ln x \cdot \cos x}$$

(13) $s(x) = 2x + \frac{1}{2x}$

$$s(x) = 2x + (2x)^{-1}$$

$$s'(x) = 2 - 2 \cdot (2x)^{-2}$$

$$\boxed{s'(x) = 2 - \frac{1}{2x^2}}$$

(14) $f(x) = \ln(\operatorname{sen} x)$

$$f'(x) = \frac{1}{\operatorname{sen} x} \cdot \cos x \Rightarrow \boxed{f'(x) = \frac{1}{\operatorname{tg} x}}$$

(15) $p(x) = 1 + \frac{1}{x} + \frac{1}{x^2} + \frac{1}{x^3}$

$$p(x) = 1 + x^{-1} + x^{-2} + x^{-3}$$

$$\boxed{p'(x) = -x^{-2} - 2x^{-3} - 3x^{-4}}$$

(16) $f(x) = e^{3x^2} + x - 5$

$$\boxed{f'(x) = 6x \cdot e^{3x^2} + 1}$$

(17) $f(x) = \sec^2 x = \frac{1}{\operatorname{sen}^2 x} = \operatorname{sen}^{-2} x$

$$f'(x) = -2 \cdot \operatorname{sen}^{-3} x \cdot \cos x$$

$$\boxed{f'(x) = -\frac{2\cos x}{\operatorname{sen}^3 x}}$$

18)

$$f(x) = x^3 \cdot 3^x$$

$$f'(x) = (x^3)' \cdot 3^x + (3^x)' \cdot x^3$$

$$f'(x) = 3x^2 \cdot 3^x + 3^x(\ln 3) \cdot x^3$$

$$f'(x) = 3x^2 \cdot 3^x + 3^x x^3 \cdot \ln 3$$

$$\boxed{f'(x) = (3 + x\ln 3) \cdot 3^x \cdot x^2}$$

19)

$$f(x) = \frac{e^x + e^{-x}}{2}$$

$$\boxed{f'(x) = \frac{1}{2}(e^x - e^{-x})}$$

20)

$$f(x) = \text{sen}^3 2x = (\text{sen}\, 2x)^3$$

$$\cancel{f'(x) = 3\,\text{sen}^2 2x}$$

$$f'(x) = 3 \cdot (\text{sen}\, 2x)^2 \cdot \cos 2x \cdot 2$$

$$\boxed{f'(x) = 6\,\text{sen}^2 2x \cos 2x}$$

ou

$$\boxed{f'(x) = 6\,\text{sen}\, 2x \cdot \text{sen}\, 4x}$$

1)

$$f(x) = 6x^3 - 5x^2 + x + 9$$

$$\frac{df(x)}{dx} = 18x^2 - 10x + 1$$

2)

$$f(x) = \text{sen}^2 x \cos^3 x$$

$$f'(x) = \cos^3 x (\text{sen}^2 x)' + \text{sen}^2 x (\cos^3 x)'$$

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

$$= 2\,\text{sen}\, x \cos^4 x - 3\,\text{sen}^3 \cdot \cos^2 x$$