Universidade Federal da Fronteira Sul - UFFS

Acadêmica: RAFAELLE ARRUDA DATA:

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Disciplina: Calculo I

Atividade de Calculo I

1- Questão

a) $f(x) = 4 - x^2 \cdot f'(-3) \cdot f'(0) \cdot f'(1)$

$f(x) = 0 - 2x$

$f'(-3) = -2 \cdot (-3) = 6$

$f'(0) = -2 \cdot 0 = 0$

$f'(1) = -2 \cdot 1 = -2$

b) $g(t) = \frac{1}{t^2}$; $g'(-1), g'(2), g'(\sqrt{3})$

$g(t) = 0$

$g'(0) = 0 - 1 = -1$

$g'(2) = 0 + 2 = 2$

$g'(\sqrt{3}) = 0 + \sqrt{3} = \sqrt{3}$

2- Questão

$$f(x) = x + \frac{9}{x} \quad , \quad x = -3$$

* substituindo $x = -3$ na função.

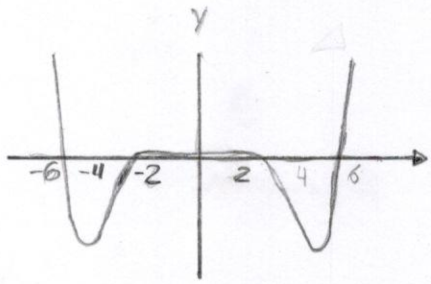
$$f(-3) = -3 + \frac{9}{-3} =$$

$$f(-3) = -3 - 3 =$$

$$f(-3) = -6$$

solução

* Grafico da função



3- Questão —— equação do enunciado! ——→ $x = 3t^2 - t^3$

a) $f(x) = 3 \cdot 4^2 - 4^3$

$f(x) = 16$

b) $x(t) = 3t^2 - t^3$

$x'(t) = 3 \cdot 2t - t^3$

$x'(t) = 6t - 3t^2$

→ substituindo os tempos

$x'(0) = 6 \cdot 0 - 3 \cdot 0^2 = 0 \, m \cdot s^{-1}$

$x'(1) = 6 \cdot 1 - 3 \cdot (1)^2 = 3 \, m \cdot s^{-1}$

$x'(2) = 6 \cdot 2 - 3 \cdot (2)^2 = 0 \, m \cdot s^{-1}$

$x'(3) = 6 \cdot 3 - 3 \cdot (3)^2 = 9 \, m \cdot s^{-1}$

$x'(4) = 6 \cdot 4 - 3 \cdot (4)^2 = 24 \, m \cdot s^{-1}$

c) $f(x) = 3t^2 - t^3$

$a(x') = 6t - 3t^2$

$a(x') = 6 - 6t$

→ substituindo os tempos na função $x''(t)$

$x''(0) = 6 - 6 \cdot (0) = 6 \, m \cdot s^{-2}$

$x''(1) = 6 - 6 \cdot (1) = 0 \, m \cdot s^{-2}$

$x''(2) = 6 - 6 \cdot (2) = -6 \, m \cdot s^{-2}$

$x''(3) = 6 - 6 \cdot (3) = -12 \, m \cdot s^{-2}$

$x''(4) = 6 - 6 \cdot (4) = -18 \, m \cdot s^{-2}$

4 - Questão

a) $f(x) = 10(3x^2 + 7x - 3)^{10}$

$u = 3x^2 + 7x - 3$

$f(x) = 10\,u^{10}$

$f' = 10 \cdot 10 \cdot u^9 \cdot u'$

$\begin{cases} u = \underbrace{3x^2 + 7x}_{} - 3 \\ 3 \cdot 2x + 7 \\ 6x + 7 \end{cases}$

$f' = 100 \cdot u^9 \cdot (6x + 7)$

$f' = 100\,(6x + 7) \cdot (3x^2 + 7x - 3)^9$

//

b) $f(t) = (7t^2 + 6t)^7 \cdot (3t - 1)^4$

$f(t) = (7t^2 + 6t)^7 \cdot (3t-1)^4 \Rightarrow f'(t) = 7\,(7t^2 + 6t)^6 \cdot (14t + 6) \cdot (3t-1)^4 +$

$+ (7t^2 + 6t)^7 \cdot 4\,(3t-1)^3 \cdot 3 \rightarrow$

$\rightarrow f'(t) = (7t^2 + 6t)^6 \cdot (3t-1)^3$

$\rightarrow [7\,(14t + 6)(3t-1) + 12\,(7t^2 + 6t)]$.

c) $f(x) = \sqrt[3]{(3x^2 + 6x - 2)^2}$

I

d) $f(t) = \sqrt{\dfrac{2t+1}{t-1}}$

e) $f(x) = 2^{3x^2+6x}$ =

* Usando regra da cadeia.

$$f'(x) = \frac{d}{dg}(2^g) \cdot \frac{d}{dx}(3x^2+6x)$$

$$f'(x) = \ln(2) \cdot 2^g \cdot \frac{d}{dx} \cdot (3x^2+6x)$$

$$f'(x) = \ln(2) \cdot 2^g \cdot (3 \cdot 2x + 6)$$

* Devolvendo substituição

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

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

f) $f(t) = e^{t/2}\,(t^2 + 5t)$

* Derivando

$$f'(t) = \frac{d}{dt}\left(e^{\frac{t}{2}} \cdot (t^2 + 5t)\right)$$

$$f'(t) = e^{t/2} \cdot \frac{1}{2} \cdot (t^2 + 5t) + e^{\frac{t}{2}} \cdot \frac{d}{dt}(t^2 + 5t)$$

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

$$f'(t) = \frac{e^{t/2} \cdot t^2 + 9\, e^{t/2}\, t}{2} + 5\, e^{t/2}$$ * simplicamos!

$$f'(t) = \frac{e^{\frac{t}{2}} \cdot t^2 + 9\, e^{t/2}\, t + 5\, e^{t_2}}{2}$$ //

g) $f(s) = \log_3 \sqrt{s+1}$

* Derivamos

$$f'(s) = \frac{d}{ds}\left(\log_3\left((s+1)^{\frac{1}{2}}\right)\right)$$

$$f'(s) = \frac{1}{2} \cdot \frac{d}{ds}\left(\log_3 (s+1)\right)$$

$$f'(s) = \frac{1}{2} \cdot \frac{d}{dg}\left(\log_3 (g)\right) \cdot \frac{d}{ds}(s+1)$$

$$f'(s) = \frac{1}{2} \cdot \frac{1}{\ln(3) g} \cdot \frac{d}{ds}(s+1)$$

$$f'(s) = \frac{1}{2} \cdot \frac{1}{\ln(3) g} \cdot 1$$

$$f'(s) = \frac{1}{2} \cdot \frac{1}{\ln(3) g}$$

$$f'(s) = \frac{1}{2} \cdot \frac{1}{\ln(3) \cdot (s+1)}$$

* continuando

$$f'(s) = \frac{1}{2\ln(3) \cdot (s+1)}$$ //

II

h) $f(u) = \cos(\pi/2 - u)$

* Derivando

$$f'(u) = \frac{d}{du}\left(\cos\left(\frac{\pi}{2} - u\right)\right)$$

$$f'(u) = \frac{d}{du}(\sin(u))$$

$$f'(u) = \cos(u)$$

i) $f(x)$ sen$^3(3x^2 + 6x)$

* Derivando

$$f'(x) = \frac{d}{dx}(\sin(3x^2 + 6x)^3)$$

$$f'(x) = \frac{d}{dg}(g^3) \cdot \frac{d}{dx}(\sin(3x^2 + 6x))$$

$$f'(x) = 3g^3 \cdot \cos(3x^2 + 6x) \cdot (3 \cdot 2x + 6)$$

$$f'(x) = 3\sin(3x^2 + 6x)^2 \cdot \cos \cdot (3x^2 + 6x) \cdot (3 \cdot 2x + 6$$

$$f'(x) = 3\sin(3x^2 + 6x)^2 \cdot \cos(3x^2 + 6x) \cdot (6x + 6)$$

IV

j) $f(x) = \dfrac{3 \sec^2 x}{x}$

* DERIVANDO

$$f'(x) = \frac{d}{dx}\left(\frac{3\sec(x)^2}{x}\right)$$

$$f'(x) = \frac{\frac{d}{dx}\left(3\sec(x)^2\right) \cdot x - 3\sec(x)^2 \cdot \frac{d}{dx}(x)}{}$$

$$f'(x) = \frac{3 \cdot 2\sec(x) \cdot \tan(x) \cdot \sec(x) \cdot x - 3\sec(x)^2 \cdot 1}{x^2}$$

$$f'(x) = \frac{6x \cdot \sin(x) - 3\cos(x)}{\cos(x)^3 \cdot x^2}$$

=

K) $f(\theta) = -\csc^2 \theta^3$

* Derivando

$$f'(\theta) = \frac{d}{d\theta}\left(-\csc(\theta^3)^2\right)$$

$$f'(\theta) = \frac{d}{dg}(-g^2) \cdot \frac{d}{d\theta}\left(\csc(\theta^3)\right)$$

$$f'(\theta) = -2g \cdot \left(-\cot(\theta^3)\csc(\theta^3) \cdot 3\theta^2\right)$$

$$f'(\theta) = 2\csc(\theta^3) \cdot \left(-\cot(\theta^3) \cdot \csc(\theta^3) \cdot 3\theta^2\right)$$

$$f'(\theta) = \frac{6\theta^2 \cdot \cos(\theta^3)}{\sin(\theta^3)^3}$$

//

Questão 5

→ Calcular $f'(0)$, se $f(x) = e^{-x} \cos 3x$.

$$f'(x) = -x' \, e^{-x} \cdot \cos(3x) + \cos(3x)' \, e^{-x} =$$

$$= -e^{-x} \cos(3x) + (-3x') \operatorname{sen}(3x) \, e^{-x} =$$

$$= -\frac{1}{e^{x}} \cos(3x) - 3 \operatorname{sen}(3x) \, e^{-x} =$$

$$= \frac{-\cos(3x)}{e^{x}} - 3 \operatorname{sen}(3x) \cdot \frac{1}{e^{x}} =$$

$$= \frac{-\cos(3x)}{e^{x}} - \frac{3 \operatorname{sen}(3x)}{e^{x}} =$$

$$= \frac{-\cos(3x) - 3\operatorname{sen}(3x)}{e^{x}}$$

$$f'(0) = -\cos(0) - 3 \operatorname{sen}(0) = \frac{-1-0}{1} = -1$$

6- Questão

* Mostrar que a função $y = x e^{-x}$ satisfaz a equação $xy' = (1-x)y$.

$y = x \cdot e^{-x}$

$y' = -x \cdot e^{-x}$

Podemos substituir

$xy = (1-x)y$

$xy' = y - xy$

$-x^2 \cdot e^{-x} = x \cdot e^{-x} - x^2 \cdot e^{-x}$

$x \cdot e^{-x} (-x) = 0$

$X = 0$ //

Questão 7. $\rightarrow$ $$\frac{db}{dt} = b(x) = 10^4 - 2(10^3)t$$

a) $b'(0) = 10^4 - 2(10^3)(0)$

$b'(0) = 10^4$ bacterias/hora

b) $b'(5) = 10^4 - 2(10^3).(5)$

$b'(5) = 0$ bacterias/hora

c) $b'(10) = 10^4 - 2(10^3).(10)$

$b'(10) = -10^4$ bacterias/hora