



UNIVERSIDADE FEDERAL DO CEARÁ - CAMPUS DE CRATEÚS
DISCIPLINAS: CÁLCULO FUNDAMENTAL I/CÁLCULO DIFERENCIAL E INTEGRAL I

Gabarito Lista II - Derivada

1. a) $\frac{f(x) - f(3)}{x - 3}$
b) $\lim_{x \rightarrow 3} \frac{f(x) - f(3)}{x - 3}$

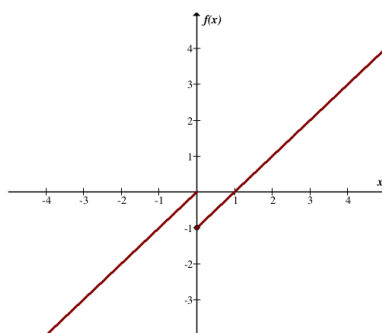
2. a) 4
b) $-\frac{\sqrt{2}}{2}$
c) $f'(0)$ não existe
d) $\frac{1}{2}$
e) 0
f) $f'(0)$ não existe

3. a) $-8x$
b) $\frac{-1}{(2x-1)\sqrt{2x-1}}$
c) $-\frac{1}{(x+2)^2}$
d) $-\frac{4}{(x+3)^2}$
e) $\frac{1}{3\sqrt[3]{(x+3)^2}}$

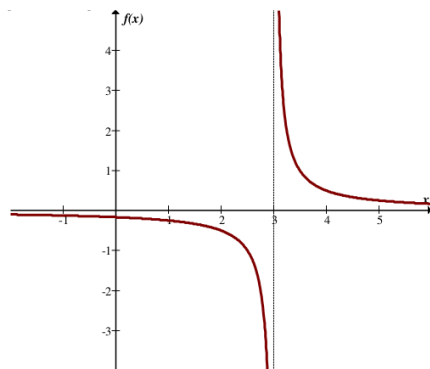
4. 2

5. a) 4
b) 8
c) 3
d) -1
e) $\frac{2}{15}$

6. $f'(0)$ não existe, pois f não é contínua em 0.



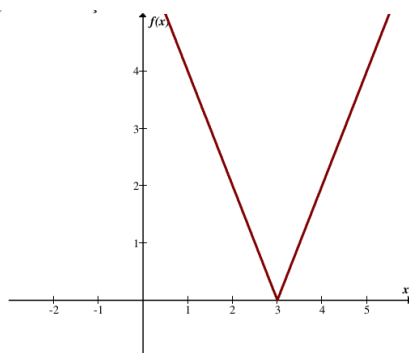
7. $f'(3)$ não existe, pois f não é contínua em 3.



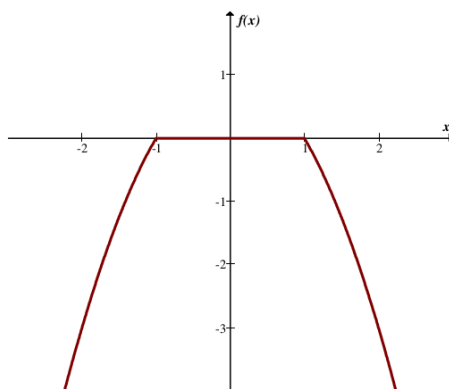
8. a) se $x > \frac{3}{4}$

b) se $x < \frac{3}{4}$

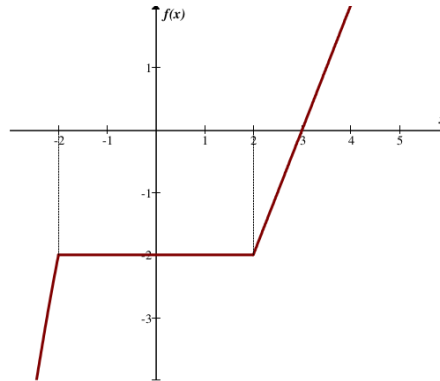
9. a) $f'_+(3) = 2$; $f'_-(3) = -2$



b) $f'_+(1) = -2$; $f'_-(1) = 0$; $f'_+(-1) = 0$; $f'_-(-1) = 2$



c) $f'_+(2) = 2$; $f'_-(2) = 0$; $f'_+(-2) = 0$; $f'_-(-2) = 4$

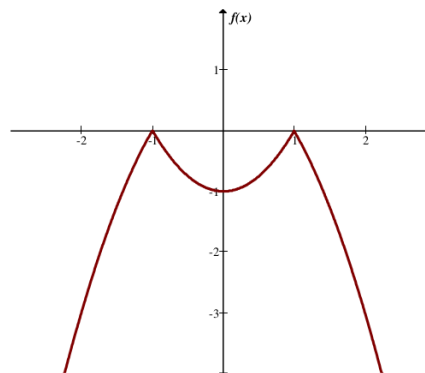


10. a) Contínua.

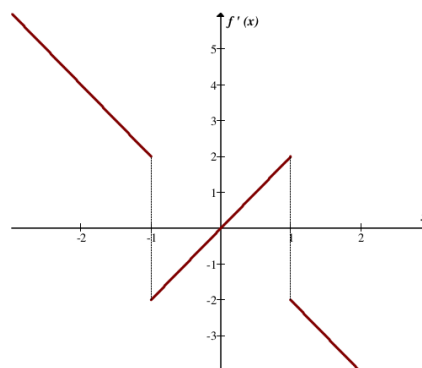
b) $f'_-(1) = 2$, $f'_+(1) = -2$, $f'_-(-1) = 2$ e $f'_+(-1) = -2$;

c) Não, pois as derivadas laterais nesses pontos são distintas. O gráfico terá um ponto anguloso nesses pontos.

d) Gráfico:



e) $f'(x) = \begin{cases} 2x & -1 < x < 1 \\ -2x, & x > 1 \text{ ou } x < -1 \end{cases}$; $D = \mathbb{R} - \{-1, 1\}$.



11. a) $f'_+(1) = 0$; $f'_-(1) = 1$; $f'(x) > 0$ para $x < 1$.

b) $f'_+(2) = 2$; $f'_-(2) = -2$; $f'(x) > 0$ para $x > 2$ e $f'(x) < 0$ para $x < 2$.

12. Não é diferenciável em -4 , pois o gráfico tem um ponto anguloso, o que significa que as derivadas laterais existem, porém são distintas. Não é diferenciável em 0 , pois a função é descontínua nesse ponto.

13. $D(f) = \{x \in \mathbb{R} | x \leq 3/5\}; D(f') = \{x \in \mathbb{R} | x < 3/5\}$

14. a) $18x^2 + 6x + 12$

b) $\frac{3}{2x^4}$

c) $-\frac{20}{(5x-3)^2}$

d) $2s(3s-1)(5s^3+2s) + 3(s^2-1)(5s^3+2s) + (s^2-1)(3s-1)(15s^2+2)$

e) $\frac{3t^2-6t-4}{(t-1)^2}$

f) $\frac{(6x^3+27x^2+36x+12)}{(x+2)^2}$

g) $\frac{t^2-2bt+2ab-a^2}{(t-b)^2}$

h) $2x^3 - 12x^{-7}$

i) $e^x(3x^2+x^3)$

j) $2a^{2x}x^3(2+x \ln a)$

k) $\text{sen}^6(x)\cos^2(x)(7\cos^2(x)-3\text{sen}^2(x))$

l) $a\cos(x) - b\text{sen}(x)$

m) $\frac{-\cos(x) - x(\text{sen}(x) + \cos(x))}{x^2e^x}$

n) $\sec(x)(\text{tg}(x) - \sec(x))$

o) $\frac{2e^{2x}}{\text{tg}^3(x)}(\text{tg}(x) - \sec^2(x))$

p) $\frac{-3}{2\sqrt{(2t+1)}\sqrt{(t-1)^3}}$

q) $6(x+1)2^{3x^2+6x} \ln 2$

r) $7(7t^2+6t)^6(14t+6)(3t-1)^4 + 12(7t^2+6t)^7(3t-1)^3$

s) $e^{t/2} \left(\frac{1}{2}t^2 + \frac{9}{2}t + 5 \right)$

t) $\frac{3x-2}{(3x-1)\sqrt{3x-1}}$

u) $(2t+1)^{t^2-1} \left[2t \ln(2t+1) + \frac{2(t^2-1)}{2t+1} \right]$

v) $(\text{sen}(x))^{x^2} [2x \ln(\text{sen}(x)) + x^2 \cot g(x)]$

w) $(e^x)^{\text{tg}(3x)} [3x \sec^2(3x) + \text{tg}(3x)]$

x) $\frac{-1+2x}{2\sqrt{xe^{2x}-x^2}}$

15. 0

16. $-\frac{128}{\pi^3} - \frac{1}{e^{\pi/4}} + 4$

17. $\frac{1}{9}$

18. a) $\frac{1}{(x+2) \ln 2}$

- b) $\frac{-(x+2)}{x(x+1)}$
- c) $(a+bx)^{\ln(a+bx)} \left(\frac{b \ln(a+bx)}{a+bx} \right)$
- d) $6 \sec^2(2x+1) + \frac{1}{2\sqrt{x}}$
- e) $\arccos(3t) - \frac{3t}{\sqrt{1-9t^2}}$
- f) $\frac{1}{2x\sqrt{x-1}}$
- g) $\frac{x \operatorname{cotgh}(x) - \ln(\sinh(x))}{x^2}$
- h) $\frac{3}{x^2} \operatorname{cosech}^3\left(\frac{3x+1}{x}\right) \operatorname{cotgh}\left(\frac{3x+1}{x}\right)$
- i) $6\theta^2 \operatorname{cosec}^2(\theta^3) \operatorname{cotg}(\theta^3)$
- j) $2utg^2(u) + 2u^2tg(u)\sec^2(u)$
- k) $\frac{2 \arcsin(x)}{\sqrt{1-x^2}}$
- l) -1
- m) $2t \operatorname{arccosec}(2t+3) - \frac{2t^2}{|2t+3|\sqrt{(2t+3)^2-1}}$
- n) $-\frac{(t+1)\operatorname{cosech}^2(t+1)^2}{\sqrt{\operatorname{cotgh}(t+1)^2}}$
- o) $-\frac{21x^2}{10\sqrt[5]{(3x+1)^6}} + \frac{7x}{\sqrt[5]{3x+1}} + \frac{3}{2\sqrt{3x+1}}$
- p) $\frac{-2t^2e^{-t^2} - e^{-t^2} - 1}{t^2}$
- q) $\frac{-\operatorname{sech}(\ln(x))tg(\ln(x))}{x}$
- r) $2t \operatorname{tgh}(t^2-1)$
- s) $\frac{3+2\sin(2x)}{(3x-\cos(2x))\ln 2}$
- t) $\cos^3\left(\frac{x}{2}\right) \sin\left(\frac{x}{2}\right) - \sin^3\left(\frac{x}{2}\right) \cos\left(\frac{x}{2}\right)$
- u) $16t(4t^2-3)\operatorname{sech}^2(4t^2-3)^2$
- v) $\frac{1}{2\sqrt{x}}$
- w) $\frac{b}{4\sqrt{ax+b}\sqrt{x^3}}$
- x) $\frac{\arcsin(x) + \arccos(x)}{\sqrt{1-x^2}\arcsin(x)\arccos(x)}$
- y) $\frac{1}{1-x^2}$
- z) $\frac{\sqrt{1-x^2}\arcsin(x) - 3x}{3\sqrt[3]{x^2}\sqrt{1-x^2}(\arcsin(x))^2}$

19. $y = \frac{11x}{4} - \frac{9}{4}$

20. $(3, 2\sqrt{2})$

21. $3e^{-4}$

22. $1 - x$

23. Mostre

24. Mostre

25. $y = x + \left(\frac{2 - 3\sqrt{3}}{3\sqrt{3}} \right)$

26. $y = -\frac{x}{64} + \frac{1026}{64}$

27. a) $-16m$

b) $v(0) = 0m/s; v(1) = 3m/s; v(2) = 0m/s; v(3) = -9m/s; v(4) = -24m/s.$

c) $a(0) = 6m/s^2; a(1) = 0m/s^2; a(2) = -6m/s^2; a(3) = -12m/s^2; a(4) = -18m/s^2.$

28. a) $v_m = 16 + 2b + h$

b) v_m em $[3; 3, 1]$ é $22, 1m/s; v_m$ em $[3; 3, 01]$ é $22, 01m/s;$

c) $v(t) = 16 + 2t;$

d) $22m/s;$

e) $2m/s^2.$

29. a) $y' = 12x^3 - 2; y'' = 36x^2; y''' = 72x; y^{(iv)} = 72; y^{(v)} = 0$

b) $y' = \frac{-x}{\sqrt{3-x^2}}; y'' = \frac{-3}{(3-x^2)\sqrt{3-x^2}}$

c) $y' = -\frac{1}{(x-1)^2}; y'' = \frac{2}{(x-1)^3}; y''' = -\frac{6}{(x-1)^4}; y^{(iv)} = \frac{24}{(x-1)^5}$

d) $y' = 2e^{2x+1}; y'' = 4e^{2x+1}; y''' = 8e^{2x+1}$

e) $y' = \text{sen}(x/2); y'' = \frac{1}{2}\cos(x/2); y''' = -\frac{1}{4}\text{sen}(x/2); y^{(iv)} = -\frac{1}{8}\cos(x/2); y^{(v)} = \frac{1}{16}\text{sen}(x/2)$

f) $y' = \sec^2(x); y'' = 2\sec^2(x)\text{tg}(x); y''' = 4\sec^2(x)\text{tg}^2(x) + 2\sec^4(x)$

30. $y^{(100)} = \text{sen}(x).$

31. Mostre.

32. $A = 6$ e $k = 2.$

33. a) $f^{(n)}(x) = (-1)^n e^{-x}$

b) $f^{(n)}(x) = 0$

c) $f^{(n)}(x) = \frac{(-1)^n n!}{x^{n+1}}$

34. a) $y' = -\frac{x^2}{y^2}$

b) $y' = -\sqrt{\frac{y}{x}}$

c) $y' = -1$

d) $y' = \frac{1}{e^y - 1}$

e) $y' = \frac{y}{\sec^2(y) - x}$

f) $y' = \frac{2x + y\cos(xy)}{2y - x\cos(xy)}$

g) $y' = \frac{1}{y(x+1)^2}$

h) $y' = \frac{2e^{2x} - \cos(x+3y)}{3\cos(x+3y)}$

35. Tangente: $y = \frac{6}{7}x + \frac{6}{7}$; Normal: $y = -\frac{7}{6}x - \frac{7}{6}$

36. Pontos: $(\sqrt{7}, 0)$ e $(-\sqrt{7}, 0)$; coeficiente angular das retas tangentes: -2 .

37. Mostre. Coeficientes angulares das tangentes: $-\frac{2}{3}$ e $\frac{3}{2}$.

38. a) $1/21$

b) -2