

Universidade de São Paulo
Escola Superior de Agricultura “Luiz de Queiroz”
Disciplina: LCE0130-Cálculo Diferencial e Integral
Prof. Reginaldo Francisco Hilário
Derivadas

Lista 2 – Derivadas – Gabarito

1) a) Como $\lim_{\Delta x \rightarrow 0^-} \frac{f(2+\Delta x)-f(2)}{\Delta x} = 4$ e $\lim_{\Delta x \rightarrow 0^+} \frac{f(2+\Delta x)-f(2)}{\Delta x} = -1$, a derivada $f'(2)$ não existe.

b) Como $\lim_{\Delta x \rightarrow 0^-} \frac{f(0+\Delta x)-f(0)}{\Delta x} = 0$ e $\lim_{\Delta x \rightarrow 0^+} \frac{f(0+\Delta x)-f(0)}{\Delta x} = 1$, a derivada $f'(0)$ não existe.

2) a) $y' = 2x^3 - 3x - 2$; $y'' = 6x^2 - 3$; $y''' = 12x$; $y^{(4)} = 12$; $y^{(5)} = 0$.

b) $y' = \frac{x^4}{24} + x^2$; $y'' = \frac{x^3}{6} + 2x$; $y''' = \frac{x^2}{2} + 2$; $y^{(4)} = x$; $y^{(5)} = 1$; $y^{(6)} = 0$.

3) a) $y' = 2x + 2$; $y'' = 2$

b) $s' = 15t^2 - 15t^4 + 1$; $s'' = 30t - 60t^3$

c) $y' = 4x^2 - 4$; $y'' = 8x$

d) $y' = \frac{2x^3-7}{x^2}$; $y'' = \frac{2x^3+14}{x^3}$

4) a) $y' = 12x - 10 + 10x^{-3}$; $y'' = 12 - 30x^{-4}$

b) $w' = -9z^{-4} + \frac{1}{z^2}$; $w'' = 36z^{-5} - \frac{2}{z^3}$

c) $r' = -\frac{2}{3s^3} + \frac{5}{2s^2} + 1$; $r'' = \frac{2}{s^4} - \frac{5}{s^3}$

d) $y' = -\frac{12}{x^2} + \frac{12}{x^4} - \frac{4}{x^5}$; $y'' = \frac{24}{x^3} - \frac{48}{x^5} + \frac{20}{x^6}$

5) a) $y' = -5x^4 + 12x^2 - 2x - 3$

b) $y' = \frac{2}{x^3} - \frac{1}{x^2} + 2x + 1$

6) a) $y' = -\frac{19}{(3x-2)^2}$

b) $f'(t) = \left(\frac{t-1}{t^2+t-2}\right)^2$

c) $y' = -\frac{6(x^2-2)}{(x-1)^2(x-2)^2}$

$$7) -\frac{nRT}{(V-nb)^2} + \frac{2an^2}{V^3}$$

$$8) a) -10 - 3\sin(x)$$

$$b) -\frac{3}{x^2} + 5\cos(x)$$

$$c) -\frac{1}{(1+\sin(x))}$$

$$d) x \sec(x) \tan(x) + \sec(x) - \frac{\cos(x)}{x^2} - \frac{\sin(x)}{x}$$

$$9) a) 12x^3$$

$$b) 48(8x - 1)^2$$

$$c) 3 \cos(3x + 1)$$

$$d) -\sin(\sin(x)) \cos(x)$$

$$10) a) -27(4 - 3x)^8$$

$$b) \left(1 - \frac{x}{7}\right)^{-8}$$

$$c) 4 \left(\frac{x^2}{8} + x - \frac{1}{x}\right)^3 \left(\frac{x}{4} + 1 + \frac{1}{x^2}\right)$$

$$d) 3\sin^2(x)\cos(x)$$

$$11) a) \frac{9}{4}x^{\frac{5}{4}}$$

$$b) \frac{\sqrt[3]{2}}{3x^{\frac{2}{3}}}$$

$$c) \frac{7}{2\sqrt{x+6}}$$

$$d) \frac{2}{7t^{\frac{5}{7}}}$$

$$e) -\frac{4\cos\left(\frac{1}{(2t+5)^{\frac{2}{3}}}\right)}{3(2t+5)^{\frac{5}{3}}}$$

$$12) a) 2e^x$$

$$b) e^{x+\sqrt{3}}$$

$$c) -\frac{3}{2}e^{-\frac{3x}{2}}$$

$$d) -5e^{-5x}$$

$$e) \frac{e^{\sqrt{x}}}{2\sqrt{x}}$$

$$f) \frac{e^x+2}{(e^{-x}+1)^2}$$

$$\mathbf{13) a) \frac{2}{x}}$$

$$b) \frac{2l(x)}{x}$$

$$c) -\frac{1}{x}$$

$$d) -\frac{1}{x}$$

$$e) \frac{1}{x+2}$$

$$f) \frac{1}{x+1}$$

$$g) \frac{2x}{x^2+1}$$

$$h) \frac{2x+c(x)}{x^2+\text{sen}(x)}$$