LISTA 4: DERIVADAS, PARTE I

Exercício 1. Calcule as derivadas, utilizando a def. da derivada:

1. $f(x)=2x^2-16x+35$ (Resp:$4x-16$)
2. $g(t)=\frac{t}{t+1}$ (Resp: $(\frac{1}{t+1})^2$)
3. $R(z)=\sqrt{5z-8}$ (Resp: $\frac{5}{2\sqrt{5z-8}}$)

Exercício 2. Determine a reta tangente para:

1. $R(z)=\sqrt{5z-8}$ no ponto $z=3$ (Resp: $y=\sqrt{7}+\frac{5}{2\sqrt{7}}(z-3)$)
2. $f(x)=4x-8\sqrt{x}$ no ponto $x=16$. (Resp: $y=32+3.(x-16)$)

Exercício 3. Calcule as derivadas (pode utilizar todas as leis das derivadas...):

a) $f(x)=15x^{100}-3x^{12}+5x-46$ (Resp: $1500x^{99}-36x^{11}+5$)

b) $g(t)=2t^6-7t^{-6}$ (Resp: $12t^5-42t^{-7}$)

c) $y=8z^3-\frac{1}{3z^5}+z-23$ (Resp: $y'=24z^2+\frac{5}{3}z^{-6}+1$)

d) $T(x)=\sqrt{x}+9\sqrt[3]{x^7}-\frac{2}{x^{2/5}}$ (Resp: $T'(x)=\frac{1}{2}x^{-1/2}+\frac{63}{3}x^{4/3}+\frac{4}{5}x^{-7/5}$)

e) $y=x^{2/3}.(2x-x^2)$ (Resp:$y'=\frac{10}{3}x^{2/3}-\frac{8}{3}x^{5/3}$)

f) $h(t)=\frac{2t^5+t^2-5}{t^2}$ (Resp: $6t^2+10t^{-3}$)

g) $h(x)=\frac{4\sqrt{x}}{x^2-2}$ (Resp: $\frac{-6x^{3/2}-4x^{1/2}}{(x^2-2)^2}$)

Exercício 4. Calcule os limites (pode utilizar derivadas!)

a) $\lim_{x\to 4}\frac{\operatorname{sen}(x-4)}{x-4}$ (Resp: $=1$)

b) $\lim_{z\to 0}\frac{\cos(2z)-1}{z}$ (Resp$=0$)

Exercício 5. Calcule as derivadas:

a) $P(t)=\frac{\operatorname{sen} t}{3-2\cos t}$ (Resp: $P'(t)=\frac{3\cos(t)-2}{(3-2\cos(t))^2}$)

b) $R(w)=4^w-5\log_9 w$ (Resp: $R'(w)=4^w\ln(4)-\frac{5}{w\ln 9}$)

c) $f(x)=3e^x+10x^3\ln x$ (Resp:$3e^x+30x^2\ln(x)+10x^2$)

d) $y = \frac{5e^x}{3e^x+1}$ (Resp: $\frac{5e^x}{(3e^x+1)^2}$)

e) $f(t) = 4\cos^{-1}t - 10\,\mathrm{tg}^{-1}t$ (Resp:$= -\frac{4}{\sqrt{1-t^2}} - \frac{10}{1+t^2}$)

f) $y = \sqrt{z}.\mathrm{sen}^{-1}z$ (Resp:$=\frac{1}{2}z^{-1/2}\mathrm{sen}^{-1}(z) + \frac{\sqrt{z}}{\sqrt{1-z^2}}$)

Exercício 6. Determine as derivadas, com a regra da cadeia:

a) $f(x) = \mathrm{sen}(3x^2+x)$ (Resp: $=(6x+1)\cos(3x^2+x)$)

b) $h(w) = e^{w^4-3w^2+9}$ (Resp:$(4w^3-6w)e^{w^4-3w^2+9}$)

c) $g(x) = \ln(x^{-4}+x^4)$ (Resp:$=\frac{-4x^{-5}+4x^3}{x^{-4}+x^4}$)

d) $f(x) = e^{g(x)}$ (Resp:$=e^{g(x)}.g'(x)$)

e) $f(x) = \ln(g(x))$ (Resp:$=\frac{g'(x)}{g(x)}$)

f) $y = \frac{(x^3+4)^5}{(1-2x^2)^3}$ (Resp:$=\frac{3x(x^3+4)^4(5x-6x^3+16)}{(1-2x^2)^4}$)

g) $f(x) = \sqrt{2y+(3y+4y^2)^3}$
Resp:$=\frac{1}{2}(2y+(3y+4y^2)^3)^{-1/2}(2+(9+24y)(3y+4y^2)^2)$