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Engenharia Civil

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EXERCÍCIOS

1) Encontrar a derivada das funções dadas.

a) $f(r) = \pi . r^2$

b) $f(x) = 3x^2 + 6x - 10$

c) $f(w) = aw^2 + b$

d) $f(x) = 14 - \frac{1}{2}x^{-3}$

e) $f(x) = (2x+1).(3x^2+6)$

f) $f(x) = (7x-1).(x+4)$

g) $f(x) = (3x^5 - 1).(2 - x^4)$

h) $f(x) = \frac{2}{3}(5x-3)^{-1}.(5x+3)$

i) $f(x) = (x-1).(x+1)$

j) $f(s) = (s^2-1).(3s-1)(5s^3+2s)$

k) $f(x) = 7(ax^2+bx+c)$

l) $f(u) = (4u^2-a).(a-2u)$

m) $f(x) = \frac{2x+4}{3x-1}$

n) $f(t) = \frac{t-1}{t+1}$

o) $f(t) = \frac{3t^2+5t-1}{t-1}$

p) $f(t) = \frac{2-t^2}{t-2}$

q) $f(x) = \frac{4-x}{5-x^2}$

r) $f(x) = \frac{5x+7}{2x-2}$

s) $f(x) = \frac{x+1}{x+2}(3x^2+6x)$

t) $f(t) = \frac{(t-a)^2}{t-b}$

u) $f(x) = \frac{3}{x^4} + \frac{5}{x^5}$

v) $f(x) = \frac{1}{2}x^4 + \frac{2}{x^6}$

2) Dadas as funções $f(x)=x^2+Ax$ e $g(x)=Bx$, determinar A e B de tal forma que $\begin{cases} f'(x)+g'(x)=1+2x \\ f(x)-g(x)=x^2 \end{cases}$:

3) Dada a função $f(t)=3t^3-4t+1$, encontrar $f(0)-t.f'(0)$.

4) Encontrar a equação da reta tangente à curva $y=\dfrac{2x+1}{3x-4}$, no ponto x = - 1.

5) Seja $y=ax^2+bx$. Encontrar os valores de a e b, sabendo que a tangente à curva no ponto (1,5) tem inclinação m = 8.

6) Determinar a equação da reta tangente às curvas, nos pontos indicados. Esboçar o gráfico em cada caso.

a) $f(x)=\dfrac{1}{x}; \quad x=\dfrac{1}{3}; \quad x=3$

b) $f(x)=\dfrac{1}{x-a}; \quad a\in\mathbb{R}-\{-2,4\}; \quad x=-2; \quad x=4$

c) $f(x)=2\sqrt{x}; \quad x=0; \quad x=3; \quad x=a, a>0$

7) Calcular as seguintes derivadas:

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

b) $f(x)=\dfrac{1}{a}\left(bx^2+ax\right)^3$

c) $f(t)=\left(7t^2+6t\right)^7.(3t-1)^4$

d) $f(t)=\left(\dfrac{7t+1}{2t^2+3}\right)^2$

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

f) $f(x)=\dfrac{2x}{\sqrt{3x-1}}$

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

h) $f(x)=\dfrac{1}{3}e^{3-x}$

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

j) $f(s)=\left(7s^2+6s-1\right)^3+2e^{-3s}$

k) $f(t)=e^{t/2}\left(t^2+5t\right)$

l) $f(x)=\log_2\left(2x+4\right)$

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

n) $f(x)=\ln\left(\dfrac{1}{x}+\dfrac{1}{x^2}\right)$

o) $f(x)=\dfrac{a^{3x}}{b^{3x^2-6x}}$

p) $f(t)=(2t+1)^{t^2-1}$

q) $f(s)=\dfrac{1}{2}(a+bs)^{\ln(a+bs)}$

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

s) $f(\theta)=2\cos\theta^2.\text{sen}2\theta$

t) $f(x)=\text{sen}^3(3x^2+6x)$

u) $f(x)=3\text{tg}(2x+1)+\sqrt{x}$

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

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

w) $f(\theta)=-\text{cosec}^2\theta^3$

y) $f(x)=a\sqrt{\cos bx}$

z) $f(u)=(u.\text{tg}u)^2$

a1) $f(\theta)=a^{\text{cotg}\theta}, a>0$

b1) $f(x)=(\text{arc sen}x)^2$

c1) $f(t)=\text{arc cos}3t$

d1) $f(t)=\text{arc cos}(\text{sen}t)$

e1) $f(x)=\text{arc sec}\sqrt{x}$

f1) $f(t)=t^2\text{arc cosec}(2t+3)$

g1) $f(x)=\dfrac{\ln(\text{senh}x)}{x}$

h1) $f(t)=\left[\text{cotgh}(t+1)^2\right]^{1/2}$

i1) $f(x)=\left[\text{cosech}\dfrac{(3x+1)}{x}\right]^3$

j1) $f(x)=x.\text{arg cosh}x-\sqrt{x^2-1}$

k1) $f(x)=x.\text{arg cotgh}x^2$

l1) $f(x)=\dfrac{1}{2}\left[\text{arg cotgh}x^2\right]^2$

Respostas:

1) a) $2\pi r$ b) $6x+6$ c) $2aw$ d) $\frac{3}{2x^4}$ e) $18x^2+6x+12$

f) $14x+27$ g) $-27x^8+30x^4+4x^3$ h) $-\frac{20}{(5x-3)^2}$ i) $2x$

j) $90s^5-25s^4-36s^3+9s^2-12s+2$ k) $14ax+7b$ l) $-24u^2+8au+2a$ m) $\frac{-14}{(3x-1)^2}$

n) $\frac{2}{(t+1)^2}$ o) $\frac{3t^2-6t-4}{(t-1)^2}$ p) $\frac{-t^2+4t-2}{(t-2)^2}$ q) $\frac{-x^2+8x-5}{(5-x^2)^2}$ r) $\frac{-6}{(x-1)^2}$ s) $\frac{3x+6(x+1)^2}{x+2}$

t) $\frac{t^2-2bt+2ab-a^2}{(t-b)^2}$ u) $-\frac{1}{x^5}\left(12+\frac{25}{x}\right)$ v) $2x^3-\frac{12}{x^7}$

2) A = B = 1/2

3) 1 + 4t

4) 11x + 49y + 4 = 0

5) a = 3 e b = 2

6) a) p/ x = 1/3 ___ y + 9x – 6 = 0; p/ x = 3 ___ 9y + x – 6 = 0
b) p/ x = - 2 ___ $y.(2 + a)^2 + x + a + 4 = 0$;
p/ x = 4 ___ $y.(4 - a)^2 + x + a – 8 = 0$
c) p/ x = 0 ___ x = 0; p/ x = 3 ___ √3 y – x – 3 = 0
p/ x = a ___ √a y – x – a = 0

7) a) $100.(3x^2+7x-3)^9.(6x+7)$ b) $\frac{3}{a}.\left(bx^2+ax\right)^2.(2bx+a)$

c) $\left(7t^2+6t\right)^6.(3t-1)^3.\left[7.(3t-1).(14t+6)+12\left(7t^2+6t\right)\right]$

d) $\frac{(14t+2).\left(-14t^2-4t+21\right)}{\left(2t^2+3\right)^3}$ e) $\frac{4.(x+1)}{\sqrt[3]{3x^2+6x-2}}$ f) $\frac{3x-2}{(3x-1)\sqrt{3x-1}}$

g) $-\frac{3}{2(t-1)^{\frac{3}{2}}.(2t+1)^{\frac{1}{2}}}$ h) $-\frac{1}{3}.e^{3-x}$ i) $2^{3x^2+6x}.6.(x+1).\ln 2$

j) $6[(7s+3).(7s^2+6s-1)^2-e^{-3s}]$ k) $e^{t/2}.\left(\frac{t^2}{2}+\frac{9}{2}t+5\right)$

l) $\frac{\log_2 e}{x+2}$ m) $\frac{\log_3 e}{2.(s+1)}$ n) $-\frac{x+2}{x.(x+1)}$ o) $\frac{a^{3x}\left[3\ln a-(6x-6)\ln b\right]}{b^{3x^2-6x}}$

p) $2.\left(t^2-1\right).(2t+1)^{t^2-2}+2t.(2t+1)^{t^2-1}.\ln(2t+1)$

q) $\frac{b}{2}\ln(a+bs)\left[(a+bs)^{\ln(a+bs)-1}+\frac{(a+bs)^{\ln(a+bs)}}{a+bs}\right]$ r) $\text{sen}(\pi/2-u)$

s) $-4.\theta\text{sen}\theta^2.\text{sen}2\theta+4\cos\theta^2.\cos 2\theta$ t) $18.(x+1)\text{sen}^2\left(3x^2+6x\right).\cos\left(3x^2+6x\right)$

u) $6\sec^2(2x+1)+\frac{1}{2\sqrt{x}}$ v) $\frac{3\sec^2 x}{x^2}(2x.\text{tg}x-1)$ x) $e^{2x}(2\cos 3x-3\text{sen}3x)$

w) $6\theta^2.\text{cosec}^2\theta^3.\text{cotg}\theta^3$ y) $-\frac{a.b\text{sen}bx}{2\sqrt{\cos bx}}$ z) m a1) $-a^{\text{cotg}\theta}.\ln a.\text{cosec}^2\theta$ b1) $\frac{2\text{arcsen}x}{\sqrt{1-x^2}}$

c1) $-\frac{3}{\sqrt{1-9t^2}}$ d1) – 1 e1) $\frac{1}{2x\sqrt{x-1}}$ f1) $\frac{-2t^2}{|2t+3|\sqrt{(2t+3)^2-1}}+2t.\text{arccossec}(2t+3)$

g1) $\frac{x.\text{cotgh}x-\ln(\text{senh}x)}{x^2}$ h1) $\frac{-(t+1)\text{cossech}^2(t+1)^2}{\sqrt{\text{cotgh}(t+1)^2}}$ i1) $\frac{3}{x^2}\text{cossech}^3\left(\frac{3x+1}{x}\right).\text{cotg}\left(\frac{3x+1}{x}\right)$

j1) $\text{arg}\cosh x$ k1) $\frac{2x^2}{1-x^4}+\text{argcotgh}x^2$ l1) $\frac{2x}{1-x^4}.argcotghx^2$