

MAT0103 — Lista 5

1. Encontre $f'(1)$ (usando os limites):

a) $f(x) = 3x^2 + 5$;

b) $f(x) = x^3 + x^2 + 1$;

c) $f(x) = 3x^3 - 2x^2 + 4$;

d) $f(x) = 3x + \sqrt{x}$;

e) $f(x) = 5 + 3x^{-2}$;

f) $f(x) = 2\sqrt{x}$;

g) $f(x) = 3x + \frac{1}{x}$;

h) $f(x) = \frac{2}{3}x^3 + \frac{1}{4}x^2$;

i) $f(x) = 2x + \frac{1}{x} + \frac{1}{x^2}$;

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

2. Encontre o valor do limite (igual a derivada da função trigonométrica em $x = a$)

a) $\lim_{x \rightarrow a} \frac{\sin(x) - \sin(a)}{x - a}$;

b) $\lim_{x \rightarrow a} \frac{\cos(x) - \cos(a)}{x - a}$;

c) $\lim_{x \rightarrow a} \frac{\tan(x) - \tan(a)}{x - a}$;

d) $\lim_{x \rightarrow a} \frac{\cotg(x) - \cotg(a)}{x - a}$.

3. Encontre $f'(x)$ (usando as regras da derivação):

a) $f(x) = 3x^2 - 5x + 1$;

b) $f(x) = x^4 - \frac{1}{3}x^3 + 2.5x^2 - 0.3x + 0.1$;

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

d) $f(x) = \sqrt[3]{x} + \sqrt[3]{2}$;

e) $f(x) = \sqrt{x}(x^3 - \sqrt{x} + 1)$;

f) $f(x) = (x + 1)^2(x - 1)$;

g) $f(x) = 0.5 - 3(a - x)^2$;

h) $f(x) = \frac{ax^2 + bx + c}{(a + b)x}$;

i) $f(x) = (x^2 - 3x + 3)(x^2 + 2x - 1)$;

j) $f(x) = (x^2 - 3x + 2)(x^4 + x^2 - 1)$;

k) $f(x) = (\sqrt{x} + 1)(\frac{1}{\sqrt{x}} - 1)$;

l) $f(x) = (\sqrt[3]{x} + 2x)(1 + \sqrt[3]{x^2} + 3x)$;

m) $f(x) = (\sqrt[3]{x} + 2x)(1 + \sqrt[3]{x^2} + 3x)$;

n) $f(x) = (x^2 - 1)(x^2 - 4)(x^2 - 9)$;

o) $f(x) = (1 + \sqrt{x})(1 + \sqrt{2x})(1 + \sqrt{3x})$.

4. Seja $f(x) = 3x - 2\sqrt{x}$. Busca $f(1)$, $f'(1)$, $f(4)$, $f'(4)$, $f(a)$, $f'(a)$.

5. Seja $f(x) = 4 - 5x + 2x^3 - x^5$. Mostre que

$$f'(x) = f'(-x).$$

6. Busca f' em seguintes casos:

a) $f(x) = \frac{x + 1}{x - 1}$;

b) $f(x) = \frac{x}{x^2 + 1}$;

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

d) $f(v) = \frac{v^3 - 2v}{v^2 + v + 1}$;

e) $f(x) = \frac{ax + b}{cx + d}$;

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

$$\text{g)} \quad f(x) = \frac{1 - x^3}{1 + x^3};$$

$$\text{h)} \quad f(x) = \frac{2}{x^3 - 1};$$

$$\text{i)} \quad f(x) = \frac{1 - x^3}{\sqrt{\pi}};$$

$$\text{j)} \quad f(x) = \frac{1}{t^2 + t + 1};$$

$$\text{k)} \quad f(x) = \frac{1}{t^2 - 3t + 6};$$

$$\text{l)} \quad f(x) = \frac{2x^4}{b^2 - x^2};$$

$$\text{m)} \quad f(x) = \frac{x^2 + x - 1}{x^3 + 1};$$

$$\text{n)} \quad f(x) = \frac{3}{(1 - x^2)(1 - 2x^3)}.$$

7. Busca f' em seguintes casos:

$$\text{a)} \quad f(x) = \text{sen}(x) + \cos(x);$$

$$\text{b)} \quad f(x) = \frac{x}{1 - \cos(x)};$$

$$\text{c)} \quad f(x) = \frac{\tan x}{x};$$

$$\text{d)} \quad f(x) = x \text{sen}(x) + \cos(x);$$

$$\text{e)} \quad f(x) = \frac{\text{sen}(x)}{x} + \frac{x}{\text{sen}(x)};$$

$$\text{f)} \quad f(t) = \frac{\text{sen}(t)}{t + \cos(t)};$$

$$\text{g)} \quad f(x) = \frac{x}{\text{sen}(x) + \cos(x)};$$

$$\text{h)} \quad f(x) = \frac{x \text{sen}(x)}{1 + \tan(x)};$$

$$\text{i)} \quad f(x) = \cos^2(x);$$

$$\text{j)} \quad f(x) = \frac{\text{sen}(x) - \cos(x)}{\text{sen}(x) + \cos(x)};$$