MAT0103 - Matemática para Administração e Contabilidade

Lista 5

1º semestre de 2025

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(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 para cada caso.

(a) $\lim\limits_{x \to a} \dfrac{\text{sen}(x) - \text{sen}(a)}{x - a}$;

(b) $\lim\limits_{x \to a} \dfrac{\cos(x) - \cos(a)}{x - a}$;

(c) $\lim\limits_{x \to a} \dfrac{\tan(x) - \tan(a)}{x - a}$;

(d) $\lim\limits_{x \to a} \dfrac{\text{cotg}(x) - \text{cotg}(a)}{x - a}$.

(3) Encontre $f'(x)$ (usando as regras de 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) $f(x) = \dfrac{ax^2 + bx + c}{(a+b)x}$;

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

(j) $f(x) = (\sqrt{x} + 1)(\dfrac{1}{\sqrt{x}} - 1)$;

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

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

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

(4) Seja $f(x) = 3x - 2\sqrt{x}$. Calcule os valores de

(a) $f(1)$ (b) $f'(1)$ (c) $f(4)$ (d) $f'(4)$ (e) $f(a)$ (f) $f'(a)$

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

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

(6) Encontre f' em seguintes casos:

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

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

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

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

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

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

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

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

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

(j) $f(t) = \dfrac{1}{t^2+t+1}$;

(k) $f(t) = \dfrac{1}{t^2-3t+6}$;

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

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

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

(7) Encontre f' em seguintes casos:

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

(b) $f(x) = \dfrac{x}{1-\cos(x)}$;

(c) $f(x) = \dfrac{\tan x}{x}$;

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

(e) $f(x) = \dfrac{\operatorname{sen}(x)}{x} + \dfrac{x}{\operatorname{sen}(x)}$;

(f) $f(t) = \dfrac{\operatorname{sen}(t)}{t+\cos(t)}$;

(g) $f(x) = \dfrac{x}{\operatorname{sen}(x)+\cos(x)}$;

(h) $f(x) = \dfrac{x\operatorname{sen}(x)}{1+\tan(x)}$;

(i) $f(x) = \cos^2(x)$;

(j) $f(x) = \dfrac{\operatorname{sen}(x)-\cos(x)}{\operatorname{sen}(x)+\cos(x)}$;