

Lista 3 de exercícios de Cálculo I

(1) Em cada um dos itens abaixo, encontre a integral indefinida.

$$a) \int \left(x + \frac{1}{x}\right) x dx \quad b) \int \sin 5x dx \quad c) \int \frac{\cos x + \operatorname{sen}(-x)}{2} dx \quad d) \int (x^2 - 9)^{2/3} x dx \quad e) \int \frac{x^3 + \sec^2(1/x)}{x^2} dx$$

(2) Usando substituição, encontre

$$\begin{array}{llll} a) \int \frac{3}{(4+x)^2} dx & b) \int \frac{8x^2}{\sqrt{x^3+2}} dx & c) \int x\sqrt{x-4} dx & d) \int (2x+3)^{11} dx \\ e) \int \frac{t^5+2t}{\sqrt{t^6+6t^2}} dt & f) \int \left(\frac{2z^2}{(z^3+5)^4} - \frac{3z}{\sqrt[3]{z^2-10}} \right) dz & g) \int (\sqrt{4t} + \cos 2t) dt & h) \int \operatorname{sen} x \cos^2 x dx \\ i) \int \operatorname{sen} x (1 - \cos^2 x) dx & j) \int \operatorname{sen}^3 x dx & k) \int \cos^3 x dx & l) \int \frac{\cos t}{\operatorname{sen}^7 t} dt \\ m) \int (2z^2 - 3)^5 z dz & n) \int \frac{x}{1+x^4} dx & & \end{array}$$

(3) Utilize as fórmulas $\operatorname{sen} a \operatorname{sen} b = \frac{1}{2}(\cos(a-b) - \cos(a+b))$, $\operatorname{sen} a \cos b = \frac{1}{2}(\operatorname{sen}(a-b) + \operatorname{sen}(a+b))$ e $\cos a \cos b = \frac{1}{2}(\cos(a-b) + \cos(a+b))$ para calcular as seguintes integrais indefinidas:

$$\begin{array}{lll} a) \int \operatorname{sen} 5x \cos x dx & b) \int \operatorname{sen} 4x \cos 2x dx & c) \int \cos 5x \cos 6x dx \\ d) \int \operatorname{sen} mx \operatorname{sen} nx dx, m, n \in \mathbb{N} & e) \int \cos mx \operatorname{sen} nx dx, m, n \in \mathbb{N} & \end{array}$$

(4) Calcule

$$a) \int \frac{x}{(x+1)^3} dx \quad b) \int \frac{x+2}{(x-3)^4} dx \quad c) \int \frac{2x-5}{(3x+1)^5} dx$$

(5) Calcule

$$\begin{array}{lll} a) \int_7^{12} dx & b) \int_{-3}^2 |x+1| dx & c) \int_1^0 t^2(t^{1/3} - \sqrt{t}) dt \\ d) \int_3^2 \frac{x^2-1}{x-1} dx & e) \int_0^1 \frac{x^4}{\sqrt[3]{x^5+7}} dx & f) \int_{-1}^0 x(x+1)^{100} dx \quad g) \int_0^{1/2} \frac{1}{\sqrt{1-x^2}} dx \\ h) \int_1^{\pi/3} \operatorname{tg} x \operatorname{sec} x dx & i) \int_5^5 \sqrt{x^2 + \sqrt{x^5+1}} dx & j) \int_{\pi/2}^{2\pi} x \cos(1-x^2) dx \quad k) \int_0^b (\sqrt{b} - \sqrt{x})^2 dx, b > 0 \end{array}$$

(6) Esboce e encontre a área da região A , que é

$$\begin{array}{ll} a) A = \{(x, y); 1 \leq x \leq 3, 0 \leq y \leq x^3\} & b) A = \{(x, y); 1 \leq x \leq 4, 0 \leq y \leq \sqrt{x}\} \\ c) A = \{(x, y); 0 \leq y \leq |\sin x|, x = -2\pi \leq x \leq 2\pi\} & \\ d) A = \{(x, y); 0 \leq y \leq 4 - x^2\} & e) \text{a região limitada delimitada por } f(x) = x^3 - 4x \text{ e } y = 0 \\ f) A = \{(x, y); x \geq 0, x^3 \leq y \leq x\} & g) \text{a região limitada delimitada por } x = y^2 \text{ e } x = 4y \\ h) \text{a região limitada delimitada por } y = x^2 \text{ e } y = 4x - x^2 & \end{array}$$