

Lista de Cálculo I - Primitivas

1. Determine as primitivas das funções abaixo:

$$\begin{array}{llll}
 \text{(a)} \int (3x + 1)dx & \text{(b)} \int \left(x + \frac{1}{x}\right)dx & \text{(c)} \int \frac{x^2 - 5x + 1}{3x^2}dx & \text{(d)} \int e^{2x}dx \\
 \text{(e)} \int \cos 3x dx, & \text{(f)} \int \sin 2x dx, & \text{(g)} \int 7e^{-3x} dx & \text{(h)} \int \frac{e^x + e^{-x}}{2} dx \\
 \text{(i)} \int (4\sqrt[5]{x^2} - \sqrt{x})dx & \text{(j)} \int x\sqrt{x}dx & \text{(l)} \int (3x - 1)^{2003}dx & \text{(m)} \int \sin^7 x \cos x dx \\
 \text{(n)} \int \tan^3 x \cos x dx & \text{(o)} \int e^x \sqrt[3]{2 + e^x} dx & \text{(p)} \int \frac{6}{4x + 3} dx & \text{(q)} \int \frac{1}{(1 - x)^4} dx \\
 \text{(r)} \int \sin 2x \sqrt{1 + \cos^2 x} dx & \text{(s)} \int \sin x \sec x dx & \text{(t)} \int \frac{\sec^2 x}{3 + 2 \tan x} dx & \text{(u)} \int x \sin 3x^2 dx \\
 \text{(v)} \int x \sqrt{32 + 4x^2} dx & \text{(x)} \int \sin 2x \cos 2x dx & \text{(z)} \int \sec^2 x \tan^2 x dx & \text{(a1)} \int \frac{x^2}{1 + x^6} dx \\
 \text{(a2)} \int 3^{2x} dx & \text{(a3)} \int \sec x dx & &
 \end{array}$$

2. Use as fórmulas trigonométricas

$$\sin a \sin b = \frac{1}{2}(\cos(a - b) - \cos(a + b)), \quad \sin a \cos b = \frac{1}{2}(\sin(a - b) + \sin(a + b)),$$

$$\cos a \cos b = \frac{1}{2}(\cos(a - b) + \cos(a + b)),$$

para calcular as seguintes integrais:

$$\begin{array}{ll}
 \text{(a)} \int \sin 5x \cos x dx & \text{(b)} \int \sin 4x \cos 2x dx \\
 \text{(c)} \int \cos 5x \cos 6x dx & \text{(d)} \int \sin mx \sin n x dx, \quad m, n \in \mathbb{N}.
 \end{array}$$

3. Utilize o algoritmo da divisão entre polinômios para calcular as seguintes primitivas:

$$\text{(a)} \int \frac{x}{x + 1} dx \quad \text{(b)} \int \frac{2x - 5}{3x + 1} dx \quad \text{(c)} \int \frac{x^2}{x + 1} dx \quad \text{(d)} \int \left(\frac{x^3}{x^2 + 1} - \frac{x^3}{x - 1}\right) dx.$$

4. Determine as seguintes primitivas:

$$\text{(a)} \int \frac{1}{a^2 + x^2} dx, \quad a > 0 \quad \text{(b)} \int \frac{3x + 2}{x^2 + 1} dx \quad \text{(c)} \int \frac{1}{(x + 1)^2 + 1} dx \quad \text{(d)} \int \frac{1}{x^2 + 4x + 5} dx$$

5. Determine as seguintes primitivas:

$$\begin{array}{ll}
 \text{(a)} \int \frac{1}{x \ln x} dx & \text{(b)} \int \frac{1}{x(\ln x)^2} dx \quad \int \frac{3x + 2}{x^2 + 1} dx \\
 \text{(e)} \int e^x (e^{2x} + 1)^{-1} dx & \text{(f)} \int x^{-1} \cos(\ln x) dx
 \end{array}$$

6. Determine as seguintes primitivas:

$$\text{(a)} \int \frac{1}{\sqrt{1 - x^2}} dx, \quad \text{(b)} \int \frac{1}{\sqrt{a^2 - x^2}} dx, \quad a > 0 \quad \text{(c)} \int \frac{dx}{\sqrt{1 - (x + 1)^2}}.$$