

Cálculo 1 - Sétima Lista de Exercícios

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1. Calcule as integrais definidas (Leithold Vol 1 página 352):

(a)

$$\int_0^1 \frac{z}{(z^2 + 1)^3} dz$$

(b)

$$\int_1^{10} \sqrt{5x - 1} dx$$

(c)

$$\int_1^4 \sqrt{x}(2 + x) dx$$

(d)

$$\int_0^1 \frac{y^2 + 2y}{\sqrt[3]{y^3 + 3y^2 + 4}} dy$$

(e)

$$\int_0^{15} \frac{w}{(1 + w)^{3/4}} dw$$

(f)

$$\int_4^5 x^2 \sqrt{x - 4} dx$$

(g)

$$\int_{-2}^5 |x - 3| dx$$

(h)

$$\int_{-1}^1 \sqrt{|x| - x} dx$$

(i)

$$\int_0^1 \frac{x^3 + 1}{x + 1} dx$$

(j)

$$\int_0^1 \sqrt{x} \sqrt{1 + x\sqrt{x}} dx$$

(k) Dica: divida o numerador pelo denominador.

$$\int_{-3}^2 \frac{3x^3 - 24x^2 + 48x + 5}{x^2 - 8x + 16} dx$$

2. Calcule as derivadas:

(a)

$$\frac{d}{dx} \int_0^x \sqrt{4+t^6} dt.$$

(b)

$$\frac{d}{dx} \int_x^3 \sqrt{\sin t} dt.$$

(c)

$$\frac{d}{dx} \int_{-x}^x \cos(t^2 + 1) dt.$$

(d)

$$\frac{d}{dx} \int_3^{\sin x} \frac{1}{1-t^2} dt.$$

3. Calcule as áreas das regiões planas delimitadas por:

(a)

$$y = 4 - x^2, \text{ eixo } x.$$

(b)

$$y = \frac{1}{x^2} - x; \text{ eixo } x, x = 2, x = 3.$$

(c)

$$y = \sin(x); \text{ eixo } x, x = \frac{\pi}{3}, x = \frac{2\pi}{3}.$$

(d) Exercício retificado

$$x^2 - y + 1 = 0, x - y + 1 = 0.$$

(e)

$$y = x^2, y = x^4$$

(f)

$$x = y^2 - 2, x = 6 - y^2.$$

(g)

$$y = x^3 + 3x^2 + 2x, y = 2x^2 + 4x$$

4. Calcule as integrais

(a)

$$\int \tan(5x) dx$$

(b)

$$\int \sec(5x) dx$$

Dica: multiplique e divida por $\sec(5x) + \tan(5x)$.

(c)
$$\int \frac{dx}{3-2x} dx$$

(d)
$$\int \frac{3x^2}{5x^3-1} dx$$

(e)
$$\int_1^3 \frac{2t+3}{t+1} dt$$

(f)
$$\int \frac{\cos t}{1+2\sin t} dt$$

(g)
$$\int \frac{2x^3}{x^2-4} dx$$

(h)
$$\int \frac{dx}{x \ln x} dx$$

(i)
$$\int \frac{2 \ln x + 1}{x[(\ln x)^2 + \ln x]} dx.$$

(j)
$$\int (\cot 5x + \csc 5x) dx$$

(k)
$$\int \frac{5-y^2}{3+2y} dy.$$

(l)
$$\int \frac{3e^{2x}}{1+e^{2x}} dx$$

(m)
$$\int \frac{e^x}{1+e^x} dx$$

(n)
$$\int_0^1 \frac{1}{1+e^x} dx.$$

Dica: multiplique numerador e denominador por e^{-x} .

(o)
$$\int \frac{10^x+1}{10^x-1} dx$$

5. Calcule as integrais indicadas por partes

(a)
$$\int xe^{3x} dx$$

(b)

$$I = \int x \sec x \tan x \, dx$$

(c)

$$I = \int (\ln x)^2 \, dx$$

(d)

$$I = \int x \arctan x \, dx$$

(e)

$$I = \int \frac{x e^x}{(x+1)^2} \, dx$$

(f)

$$I = \int \sin x \ln(\cos x) \, dx$$

(g)

$$I = \int e^x \cos x \, dx$$

(h)

$$I = \int e^{3x} \sin(5x) \, dx$$

(i)

$$I = \int \frac{x^3}{\sqrt{1-x^2}} \, dx$$

(j)

$$I = \int \cos(\sqrt{x}) \, dx$$

(k)

$$I = \int_0^2 x^2 3^x \, dx$$

(l)

$$I = \int_0^2 x e^{2x} \, dx$$

(m)

$$I = \int_0^{\pi/4} e^{3x} \sin(4x) \, dx$$

(n)

$$I = \int_0^1 x \arcsin x \, dx$$

6. Calcule as integrais (Leithold páginas 541 e 545)

(a)

$$I = \int \cos^3(4x) \sin(4x) \, dx$$

(b)

$$I = \int \sin^3(x) dx$$

(c)

$$I = \int \sin^2(3t) \cos^2(3t) dt$$

(d)

$$I = \int \frac{\cos^3(3x)}{\sqrt[3]{\sin(3x)}} dx.$$

(e)

$$I = \int \cos^6 x dx.$$

(f)

$$I = \int x \cot^2(2x^2) dx$$

(g)

$$I = \int \cot^3 t dt$$

(h)

$$I = \int \tan^6(3x) dx$$

(i)

$$I = \int \tan^6 x \sec^4 x dx$$

(j)

$$I = \int \frac{\sec^3 x}{\tan^4 x} dx.$$

(k)

$$I = \int_{-\pi/4}^{\pi/4} \sec^6 x dx.$$

7. Calcule as integrais por substituição trigonométrica (Leithold página 550)

(a)

$$I = \int \frac{dx}{x^2 \sqrt{4-x^2}}$$

(b)

$$I = \int \frac{dx}{x \sqrt{x^2+4}}$$

(c)

$$I = \int \frac{dx}{x \sqrt{25-x^2}}.$$

(d)

$$I = \int \frac{dx}{\sqrt{x^2-a^2}}$$

(e)

$$I = \int \frac{dx}{\sqrt{4x + x^2}}$$

(f)

$$I = \int \frac{dx}{(5 - 4x - x^2)^{3/2}}$$

(g)

$$I = \int \frac{\ln^3 w \, dw}{w\sqrt{\ln^2 w - 4}}$$

(h)

$$I = \int \frac{e^t \, dt}{(e^{2t} + 8e^t + 7)^{3/2}}$$