

Lista de Exercícios 2

Cálculo I

Exercício 1 Determine as seguintes primitivas:

- (a) $\int \frac{e^{2x}}{1+e^{4x}} dx$
- (b) $\int \frac{1}{\sqrt{8-x^2}} dx$
- (c) $\int \frac{1}{\sqrt{1-x}} dx$
- (d) $\int e^{3\cos^2(x)} \sin(x) \cos(x) dx$
- (e) $\int e^{x^2+4x+3} (x+2) dx$
- (f) $\int e^{\tan x} \sec^2(x) dx$
- (g) $\int \sin(\sqrt{2}x) dx$
- (h) $\int \sin(x) \cos^5(x) dx$
- (i) $\int \frac{x}{x^2+9} dx$
- (j) $\int x \cdot 7^{x^2} dx$
- (k) $\int \frac{3x}{\sqrt{1-x^4}} dx$
- (l) $\int \frac{\ln(x)}{x} dx$
- (m) $\int \frac{\arctan(x)}{1+x^2} dx$
- (n) $\int \frac{x^2+1}{x} dx$
- (o) $\int \frac{e^{\arcsen(x)}}{\sqrt{1-x^2}} dx$
- (p) $\int \tan^2(x) dx$
- (q) $\int \frac{1}{x\sqrt{1-(\ln(x))^2}} dx$
- (r) $\int \tan^3(x) dx$
- (s) $\int \frac{1}{x^2+2x+5} dx$
- (t) $\int \frac{\arccos(x)-x}{\sqrt{1-x^2}} dx$
- (u) $\int \frac{\cos(\ln(x^2))}{x} dx$
- (v) $\int \frac{x^3}{1+x^8} dx$
- (w) $\int \sin^5(x) \cos^2(x) dx$
- (x) $\int \sin^4(x) dx$

Exercício 2 Determine a primitiva da função $f(x) = \frac{1}{x^2} + 1$ que se anula no ponto $x = 2$.

Exercício 3 Determine a função $f : \mathbb{R} \rightarrow \mathbb{R}$ tal que

$$f'(x) = \frac{2e^x}{3+e^x}, \quad f(0) = \ln(4).$$

Exercício 4 Sabendo que a função f satisfaz a igualdade

$$\int f(x)dx = \sin(x) - x \cos(x) - \frac{1}{2}x^2 + c, \quad c \in \mathbb{R}$$

determine $f\left(\frac{\pi}{4}\right)$.

Respostas

1a. $\frac{1}{2} \arctan(e^{2x}) + c, \quad c \in \mathbb{R}$

1b. $\arcsen\left(\frac{x}{\sqrt{8}}\right) + c, \quad c \in \mathbb{R}$

1c. $-2\sqrt{1-x} + c, \quad c \in \mathbb{R}$

1d. $-\frac{1}{6}e^{3\cos^2(x)} + c, \quad c \in \mathbb{R}$

1e. $\frac{1}{2}e^{x^2+4x+3} + c, \quad c \in \mathbb{R}$

1f. $e^{\tan(x)} + c, \quad c \in \mathbb{R}$

1g. $-\frac{1}{\sqrt{2}} \cos(\sqrt{2}x) + c, \quad c \in \mathbb{R}$

1h. $-\frac{\cos^6(x)}{6} + c, \quad c \in \mathbb{R}$

1i. $\frac{1}{2} \ln|x^2+9| + c, \quad c \in \mathbb{R}$

1j. $\frac{7^{x^2}}{2\ln 7} + c, \quad c \in \mathbb{R}.$

1k. $\frac{3}{2} \arcsen(x^2) + c, \quad c \in \mathbb{R}$

1l. $\frac{\ln^2(x)}{2} + c, \quad c \in \mathbb{R}.$

- 1m. $\arctan^2(x) + c, c \in \mathbb{R}$
- 1n. $\frac{x^2}{2} + \ln|x| + c, c \in \mathbb{R}$
- 1o. $e^{\arcsin(x)} + c, c \in \mathbb{R}$
- 1p. $\tan(x) - x + c, c \in \mathbb{R}$
- 1q. $\arcsin(\ln|x|) + c, c \in \mathbb{R}$
- 1r. $\frac{\tan^2(x)}{2} - \ln|\cos(x)| + c, c \in \mathbb{R}$
- 1s. $\frac{1}{2} \arctan\left(\frac{x+1}{2}\right) + c, c \in \mathbb{R}$
- 1t. $\frac{\arccos^2(x)}{2} + \sqrt{1-x^2} + c, c \in \mathbb{R}$
- 1u. $\frac{1}{2} \sin(\ln(x^2)) + c, c \in \mathbb{R}$
- 1v. $\frac{1}{4} \arctan(x^4) + c, c \in \mathbb{R}$
- 1w. $-\frac{\cos^3(x)}{3} + 2\frac{\cos^5(x)}{5} - \frac{\cos^7(x)}{7} + c, c \in \mathbb{R}$
- 1x. $\frac{3}{8}x - \frac{\sin(2x)}{4} + \frac{\sin(4x)}{32} + c, c \in \mathbb{R}$
2. $-\frac{1}{x} + x - \frac{3}{2}$
3. $f(x) = 2 \ln|3 + e^x| - \ln 4$
4. $\frac{\pi}{4} \left(\frac{\sqrt{2}}{2} - 1 \right)$