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) $\int \sin\left(\sqrt{2}x\right)dx$

(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) $\int \frac{e^{\text{arcsen}(x)}}{\sqrt{1-x^2}}dx$

(p) $\int \tan^2(x)dx$

(q) $\int \frac{1}{x\sqrt{1-(\ln(x))^2}}dx$

(r) $\int \tan^3(x)dx$

(s) $\int \frac{1}{x^2+2x+5}$

(t) $\int \frac{\arccos(x)-x}{\sqrt{1-x^2}}dx$

(u) $\int \frac{\cos\left(\ln\left(x^2\right)\right)}{x}dx$

(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 $f : \mathbb{R} \to \mathbb{R}$ 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

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

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

Respostas

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

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

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

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

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

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

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

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

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

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

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

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

1m. $\arctan^2(x) + c, c \in \mathbb{R}$

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

1o. $e^{\text{arcsen}(x)} + c, c \in \mathbb{R}$

1p. $\tan(x) - x + c, c \in \mathbb{R}$

1q. $\text{arcsen}(\ln|x|) + c, c \in \mathbb{R}$

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. $\frac{\pi}{4}\left(\frac{\sqrt{2}}{2} - 1\right)$