

Integrais Impróprios

1. Indique os domínios das funções integrandas e calcule os integrais

a) $\int_0^{+\infty} x e^{-x^2} dx$

f) $\int_1^{+\infty} \frac{1}{x^2} dx$

b) $\int_{-\infty}^0 \frac{x}{1+x^4} dx$

g) $\int_{-\infty}^{+\infty} e^{2x} dx$

c) $\int_{-\infty}^{+\infty} \frac{2x}{x^2+1} dx$

h) $\int_0^{+\infty} x e^{-x} dx$

d) $\int_{-\infty}^0 \frac{1}{\sqrt{(1-2x)^3}} dx$

i) $\int_1^{+\infty} \frac{\sqrt{x}}{x+1} dx$ (faça $\sqrt{x} = t$)

e) $\int_2^{+\infty} \frac{1}{x \ln^2(x)} dx$

2. Indique os domínios das funções integrandas e calcule os integrais

a) $\int_1^2 \frac{1}{\sqrt[3]{x-1}} dx$

e) $\int_0^{\frac{\pi}{2}} \operatorname{tg}(x) dx$

b) $\int_{-1}^0 \frac{e^{2x}}{\sqrt{1-e^{2x}}} dx$

f) $\int_{-1}^1 \frac{1}{x^2} dx$

c) $\int_0^3 \frac{1}{(x-1)^3} dx$

g) $\int_1^2 \frac{1}{x-1} dx$

d) $\int_1^e \frac{1}{x \sqrt[3]{\ln(x)}} dx$

Soluções

1. a) $D = \mathbb{R}$ $\frac{1}{2}$

e) $D =]0, +\infty[$ $\frac{1}{\ln(2)}$

b) $D = \mathbb{R}$ $-\frac{\pi}{4}$

f) $D = \mathbb{R} \setminus \{0\}$ 1

c) $D = \mathbb{R}$ divergente

g) $D = \mathbb{R}$ divergente

d) $D = \left] -\infty, \frac{1}{2} \right[$ 1

h) $D = \mathbb{R}$ 1

i) $D =]0, +\infty[$ divergente

2. a) $D = \mathbb{R} \setminus \{1\}$ $\frac{3}{2}$

e) $D = \left\{ x \in \mathbb{R} : x \neq \frac{\pi}{2} + k\pi, k \in \mathbb{Z} \right\}$ divergente

b) $D =]-\infty, 0[$ $\frac{\sqrt{e^2-1}}{e}$

f) $D = \mathbb{R} \setminus \{0\}$ divergente

c) $D = \mathbb{R} \setminus \{1\}$ divergente

g) $D = \mathbb{R} \setminus \{1\}$ divergente

d) $D =]0, 1[\cup]1, +\infty[$ $\frac{3}{2}$