083119 - Métodos de Matemática Aplicada - Turma

Primeira lista de exercícios

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1. Calcule as integrais impróprias

   (a) $\displaystyle\int_{-\infty}^{3} \frac{dx}{(9-x)^2}$

   (b) $\displaystyle\int_{-\infty}^{0} e^{-x}dx.$

   (*Resposta:* (a) $\dfrac{1}{6}$ (b) Diverge)

2. Determine para que valores de $p \in \mathbb{R}$ a integral $\displaystyle\int_1^{\infty} \frac{1}{x^p}\,dx$ é convergente.

   (*Resposta:* A integral converge $\Leftrightarrow p > 1$)

3. Calcule $\displaystyle\int_{-\infty}^{\infty} \frac{1}{1+x^2}\,dx.$

   (*Resposta:* π)

4. Calcule:

   (a) $\displaystyle\int_{-2}^{0} \frac{1}{(x+1)^{1/3}}\,dx$

   (b) $\displaystyle\int_0^{\pi} \operatorname{tg} x\,dx.$

   (*Respostas:* (a) 0 (b) Diverge)

5. Calcule

   (a) $\displaystyle\int_{3/2}^{4} \left(x - \frac{3}{2}\right)^{-2} dx$

   (b) $\displaystyle\int_0^{\pi/2} \frac{\cos x}{\sqrt{\operatorname{sen} x}}\,dx.$

   (*Respostas:* (a) Diverge (b) 2)

6. Analise a convergência das integrais

   $$\text{(a)} \int_2^{\infty} \frac{1}{(t-1)^{\frac{3}{2}}}dt\ , \quad \text{(b)} \int_0^{\infty} te^{-t^2}dt,$$

   $$\text{(c)} \int_1^{\infty} \frac{\ln t}{t}dt\ , \qquad \text{(d)} \int_e^{\infty} \frac{1}{t(\ln t)^2}dt.$$

   (*Respostas:* (a) Converge (b) Converge (c) Diverge (d) Converge)