

Lista 4

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- Resolva os exercícios abaixo.
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1. Calcule os resíduos das funções abaixo em  $z = 0$ .

(a)  $\exp(1 + \frac{1}{z})$ .

(b)  $z^{-3} \cosh(4z)$ .

(c)  $\frac{z^2 + 4z + 5}{z^2 + z}$

(d)  $\frac{\exp(4z) - 1}{\operatorname{sen}^2(z)}$

2. Calcule as integrais complexas.

(a)  $\int_{|z|=3} \frac{10z}{(z^2 + 4)(z^2 + 16)} dz$

(b)  $\int_{|z|=1} \frac{z^2 - 7z + 4}{z^2(z + 4)} dz$

3. Calcule as integrais trigonométricas.

(a)  $\int_0^{2\pi} \frac{d\theta}{5 + 3\cos(\theta)}$

(b)  $\int_0^{2\pi} \frac{\operatorname{sen}^2(\theta)}{5 - 3\cos(\theta)} d\theta$

4. Calcule o valor principal (de Cauchy) das seguintes integrais racionais.

(a)  $\int_{-\infty}^{+\infty} \frac{dx}{x^2 + 25}$

(b)  $\int_{-\infty}^{+\infty} \frac{3x^2 + 2}{(x^2 + 4)(x^2 + 9)} dx$

5. Calcule o valor principal das seguintes integrais mistas (racionais-trigonométricas).

(a)  $\int_{-\infty}^{+\infty} \frac{x \operatorname{sen}(x)}{(x^2 + 4)^2} dx$

(b)  $\int_{-\infty}^{+\infty} \frac{\cos(x)}{(x^2 + 4)(x^2 + 9)} dx$

6. Calcule o valor principal das integrais:

$$\int_{-\infty}^{+\infty} \frac{x}{x^3 + 1} dx \quad \text{e} \quad \int_{-\infty}^{+\infty} \frac{\operatorname{sen}(x)}{x} dx.$$