S · T · Q · Q · S · S · D
L M M J V S D

Cálculo II
Estimativas de Erro

$$\sum_{n=1}^{\infty} \frac{1}{n^4}$$

$$\sum_{n=1}^{100} \frac{1}{n^4} = S10 = \frac{1}{1^4} + \frac{1}{2^4} \dots \frac{1}{10^4} = 1.0820$$

$$R_{10} \leq \int_{10}^{\infty} \frac{1}{x^4}\,dx = \lim_{t \to \infty} \int_{10}^{t} \frac{1}{x^4}\,dx$$

$$\lim_{t \to \infty} \left(-\frac{1}{3t^3} - \left(-\frac{1}{3 \cdot 10^3} \right) \right) = \frac{1}{3000} = 0{,}000333\dots$$

$S10 = 1{,}0820$

$R_{10} \leq 0{,}000\overline{3}$ //

Encontre um valor de N tal que Sn represente a soma com precisão de 0,00001

$$R_n \leq \int_{n}^{\infty} f(x)\,dx = \lim_{t \to \infty} \int_{n}^{t} \frac{1}{x^4}\,dx$$

$$\lim_{t \to \infty} \left(-\frac{1}{3t^3} - \left(-\frac{1}{3n^3} \right) \right) = \frac{1}{3n^3}$$

$$R_n \leq \frac{1}{3n^3}$$

$R_n \le \dfrac{1}{3n^3}$ e $R_n \le 0{,}00001$

$$\frac{1}{3n^3} \geq \frac{100\,000}{3}$$

$$n \geq 10\sqrt[3]{\frac{100}{3}} \qquad \boxed{n \geq 33}$$