

ESERCIZI SULLE SERIE NUMERICHE

Esercizio 1

Studiare la convergenza semplice ed assoluta delle seguenti serie:

$$(i) \sum_{n=1}^{\infty} \left(\frac{3x-10}{2} \right)^n \cdot \frac{1}{n^2}$$

$$(ii) \sum_{n=1}^{\infty} \left(\frac{\cos n\pi}{x-2} \right)^n \cdot \frac{1}{n}$$

$$(iii) \sum_{n=1}^{\infty} (\ln x + 4)^n, \quad x > 0$$

$$(iv) \sum_{n=1}^{\infty} \left(e^{-x} + \frac{3}{5} \right)^n$$

$$(v) \sum_{n=1}^{\infty} \left(e^{x^2-2} - 2 \right)^n \cdot \frac{1}{\sqrt{n}}$$

Esercizio 2

Studiare la convergenza delle serie:

$$(i) \sum_{n=1}^{\infty} \frac{(-1)^n}{\ln n}$$

$$(ii) \sum_{n=1}^{\infty} \frac{\cos n\pi}{e^n + 3n}$$

$$(iii) \sum_{n=1}^{\infty} \frac{(-1)^n}{n^2 - 20n + 2}$$

$$(iv) \sum_{n=1}^{\infty} \frac{\sin\left(\frac{\pi}{2}(2n+1)\right)}{n} \cdot \ln n$$

Esercizio 3

Studiare la convergenza semplice ed assoluta delle seguenti serie:

$$(i) \sum_{n=1}^{\infty} \left(\frac{1+x}{1+nx} \right)^n$$

$$(ii) \sum_{n=1}^{\infty} \frac{\log(n^2 x)}{n^2 + x^2}, \quad x > 0$$

$$(iii) \sum_{n=1}^{\infty} \frac{x^n}{2+x^n}$$

$$(iv) \sum_{n=1}^{\infty} \frac{x^{2n}}{n} + \frac{n^{2x}}{x}, \quad x > 0$$

$$(v) \sum_{n=1}^{\infty} \frac{1}{3+(\log x)^{2n}}, \quad x > 0$$

$$(vi) \sum_{n=1}^{\infty} \log \left(\sqrt[n]{1 + \frac{x}{n}} \right), \quad x > 0$$

$$(vii) \sum_{n=1}^{\infty} \left(1 + \frac{1}{n}\right)^{n^2} (2a + 1)^n,$$

$$(viii) \sum_{n=1}^{\infty} \frac{x + \sin \frac{x}{n}}{n^x}$$