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

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

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

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

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

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

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

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

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