Studia il carattere delle seguenti serie:

$$\sum_{n=1}^{\infty}\left[\frac{\sin(nx)}{3n^3+5n}+\frac{\cos(nx)}{n^4+7}\right] \qquad \sum_{n=1}^{\infty}(-1)^n\frac{1}{n-\log n} \qquad \sum_{n=1}^{\infty}\frac{\log n-\sqrt{n}}{n+1}$$

$$\sum_{n=100}^{\infty}\frac{n\sqrt{n}}{2^n}, \qquad \sum_{n=1}^{\infty}\frac{\cos(2n+1)}{n\sqrt{n}} \qquad \sum_{n=0}^{\infty}\frac{n+\sin(n)}{1+n^2}$$

$$\sum_{n=0}^{\infty}\frac{(-1)^n}{n+2e^{-n}} \qquad \sum_{n=4}^{\infty}\frac{(n-3)^n}{n^{n+1}} \qquad \sum_{n=1}^{\infty}\frac{n!}{n^n}$$

$$\sum_{n=0}^{\infty}\frac{\sqrt{n}\cdot 3^{n+1}}{n!} \qquad \sum_{n=4}^{\infty}(-1)^n\log\frac{n-2}{n+1} \qquad \sum_{n=1}^{\infty}\frac{3^{3n}\cdot n!}{(2n+1)!}$$

$$\sum_{n=1}^{\infty}\log\left(\frac{n+1}{n^2}\right) \qquad \sum_{n=2}^{\infty}\frac{1}{\log(n+1)} \qquad \sum_{n=1}^{\infty}(-1)^n\left(e^{\frac{2}{n}}-e^{\frac{1}{n}}\right)$$

$$\sum_{n=1}^{\infty}\log\left(\frac{n^3+1}{n^3-3n}\right)\log n \qquad \sum_{n=1}^{\infty}e^{\sin n}\left(\sin\frac{1}{n}+\sin\left(\frac{1}{e^n}\right)\right) \qquad \sum_{n=1}^{\infty}e^{\sin n}\left(\sin\frac{1}{n}\right)\left(e^{\frac{1}{\sqrt{n}}}-1\right)\cos n$$

$$\sum_{n=1}^{\infty}\sin n\cdot\sin\frac{1}{n}\left(\cos\frac{1}{\sqrt{n}}-1\right) \qquad \sum_{n=45}^{\infty}\frac{5n+(-1)^n\cdot n^2+\log^4 n}{2n^3} \qquad \sum_{n=20}^{\infty}\frac{(-1)^n\cdot n+\sin n}{n^2\log n}$$

$$\sum_{n=1}^{\infty}\left[(-1)^n\cdot arctg(n)\cdot arctg\left(\frac{1}{n}\right)\right] \qquad \sum_{n=2}^{\infty}(-1)^n\frac{\log(\log n)}{n}$$

Utilizzando la serie geometrica scrivere sotto forma di frazione i seguenti numeri decimali periodici:
$0.\overline{4}$ e $0.\overline{35}$

Determinare per quali $\alpha\in\mathbb{R}$ la serie converge:
$$\sum_{n=1}^{\infty}\left[\log\left(\frac{n+2}{n+1}\right)\right]^{\alpha}$$, con $\alpha>0$

Calcola la somma delle seguenti serie:

$$\sum_{n=2}^{\infty}\left(\frac{1}{\sqrt{n}}-\frac{1}{\sqrt{n+1}}\right) \qquad \sum_{n=2}^{\infty}\frac{2^n}{3^{2n}} \qquad \sum_{n=0}^{\infty}\frac{(-1)^n 3^{n+1}}{4^n}$$

Calcola la somma delle seguenti serie riconoscendole come serie di potenze notevole, calcolata in un punto particolare:

$$\sum_{n=1}^{\infty}\frac{1}{n2^n} \qquad \sum_{n=1}^{\infty}(-1)^n 2^n e^{-3n} \qquad \sum_{n=0}^{\infty}(-1)^n\frac{1}{2^n(2n)!}$$

Calcola la somma della seguente serie in campo complesso e riscrivere la somma in forma algebrica

$$\sum_{n=1}^{\infty}\frac{(-1)^n}{2^n}(1+i)^n \qquad \sum_{n=0}^{\infty}i^n\frac{(1+2i)^n}{3^{2n}}$$