

Analisi Matematica 2

Foglio di esercizi n. 1

1. Studiare il comportamento delle seguenti serie:

a. $\sum_{k=1}^{\infty} \frac{1}{k^{1+\frac{1}{k}}}$	b. $\sum_{k=0}^{\infty} (\sin(\cos(k)))^k$	c. $\sum_{k=0}^{\infty} \cos(\pi k) \arctan(e^{-k})$
d. $\sum_{k=1}^{\infty} \frac{1}{k \log(k^2 + 1)}$	e. $\sum_{k=2}^{\infty} \frac{1}{(\log(k))^{\log(k)}}$	f. $\sum_{k=1}^{\infty} \frac{\sqrt{k^2 + 1} - k}{e^{-k} + \log^2(k)}$
g. $\sum_{k=1}^{\infty} k^k e^{-k^2}$	h. $\sum_{k=1}^{\infty} \frac{(-1)^k k + \sin(k)}{k^2 + 1}$	i. $\sum_{k=1}^{\infty} (\sqrt{k^3 + 1} - \sqrt{k^3 - 1})$
j. $\sum_{k=1}^{\infty} \frac{k^{\sqrt{k}}}{k!}$	k. $\sum_{k=1}^{\infty} \frac{\log(k!)}{k^3}$	l. $\sum_{k=1}^{\infty} \frac{1}{2^{\log(k)}}$
m. $\sum_{k=0}^{\infty} \frac{(k!)^2}{(2k)!}$	n. $\sum_{k=1}^{\infty} \left(\frac{4k+1}{4k+3} \right)^k$	o. $\sum_{k=1}^{\infty} \left(\frac{\cos^2(\frac{1}{k}) - \sin^2(\frac{2}{k})}{\cos(\frac{3}{k})} \right)^{k^3}$

2. Determinare per ciascuna serie l'insieme di convergenza per $x \in \mathbb{R}$:

a. $\sum_{k=1}^{\infty} \frac{k^2}{k^5 + 3} (2x - 1)^k$	b. $\sum_{k=1}^{\infty} \frac{(-1)^k \sqrt{k}}{k^{3x} + k}$
c. $\sum_{k=1}^{\infty} \frac{k^x + k^2}{k^{2x} + k^3}$	d. $\sum_{k=1}^{\infty} x^{k!}$
e. $\sum_{k=1}^{\infty} \frac{4^k + 1}{3^k + 2} \left(\frac{x - 3}{2} \right)^{2k}$	f. $\sum_{k=1}^{\infty} \frac{1}{1 + (3x)^k}$

3. Calcolare le somme delle seguenti serie:

a. $\sum_{k=1}^{\infty} \frac{3 \cdot 4^k - 2 \cdot 5^k}{20^{k-1}}$	b. $\sum_{k=1}^{\infty} \frac{1}{4k^2 + 8k + 3}$
c. $\sum_{k=2}^{\infty} \log \left(1 - \frac{1}{k^2} \right)$	d. $\sum_{k=1}^{\infty} \frac{3^k + k}{(k+1)!}$
e. $\sum_{k=1}^{\infty} \frac{k^3}{k!}$	f. $\sum_{k=1}^{\infty} \frac{k^2}{3^k}$