

# Analisi Matematica 1 - Lista n. 30

Studio del carattere di Serie a Termini Positivi

Titolo nota

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Studiare il carattere delle seguenti serie:

1)  $\sum_{n=1}^{+\infty} \frac{1}{n^4 + 1}$  **CONVERGE**

2)  $\sum_{n=0}^{+\infty} \frac{1}{2^n + 3^n}$  **CONVERGE**

3)  $\sum_{n=1}^{+\infty} \frac{n^4}{n^2 + n^4}$  **DIVERGE**

4)  $\sum_{n=1}^{+\infty} \ln\left(1 + \frac{1}{n}\right)$  **DIVERGE**

5)  $\sum_{n=0}^{+\infty} e^{-\sqrt{n}}$  **CONVERGE**

6)  $\sum_{n=1}^{+\infty} \frac{1}{n^n}$  **CONVERGE**

7)  $\sum_{n=0}^{+\infty} \frac{e^{\sin n}}{1 + n^2}$  **CONVERGE**

8)  $\sum_{n=1}^{+\infty} \frac{1}{n^{\ln n}}$  **CONVERGE**

9)  $\sum_{n=1}^{+\infty} \frac{e^{\cos n}}{n}$  **DIVERGE**

10)  $\sum_{n=1}^{+\infty} \ln\left(1 + \frac{1}{n^2}\right)^{\sqrt{n}}$  **CONVERGE**

11)  $\sum_{n=1}^{+\infty} \frac{1}{(1+n) \cdot \sqrt{\ln(1+n^4)}}$  **DIVERGE**

12)  $\sum_{n=1}^{+\infty} \frac{1}{n \cdot \ln^2(1+\sqrt{n})}$  **CONVERGE**

13)  $\sum_{n=0}^{+\infty} \frac{(n!)^2}{(2n)!}$  **CONVERGE**

14)  $\sum_{n=1}^{+\infty} \frac{(3n)!}{n^{4n}}$  **CONVERGE**

15)  $\sum_{n=1}^{+\infty} \frac{(n+1)^{n-1}}{n^{n+1}}$  **CONVERGE**

16)  $\sum_{n=3}^{+\infty} \left(\frac{\ln(\ln n)}{\ln n}\right)^{\sqrt{n}}$  **CONVERGE**

17)  $\sum_{n=2}^{+\infty} \frac{1}{\ln(n!)}$  **DIVERGE**

18)  $\sum_{n=2}^{+\infty} \frac{1}{(\ln n)^{\ln n}}$  **CONVERGE**

19)  $\sum_{n=3}^{+\infty} \frac{1}{(\ln(\ln n))^{\ln n}}$  **CONVERGE**

20)  $\sum_{n=3}^{+\infty} \frac{1}{(\ln n)^{\ln(\ln n)}}$  **DIVERGE**

21)  $\sum_{n=3}^{+\infty} n^{-1 - \frac{1}{\ln(\ln n)}}$  **CONVERGE**

22)  $\sum_{n=1}^{+\infty} n^{-\sqrt{n}}$  **DIVERGE**

23)  $\sum_{n=1}^{+\infty} \frac{\cos(\cos n)}{n \cdot \ln n}$  **DIVERGE**

24)  $\sum_{n=1}^{+\infty} (\sin(\sin n))^n$  **CONVERGE**

$$25) \sum_{n=1}^{+\infty} \left( \arctan \frac{1}{\sqrt[n]{n}} - \sin \frac{1}{\sqrt[n]{n}} \right) \quad \text{DIVERGE}$$

$$26) \sum_{n=1}^{+\infty} \left( \sqrt{1 - \frac{1}{\sqrt[n]{n}}} - \cos \frac{1}{\sqrt[n]{n}} \right) \quad \text{DIVERGE}$$

$$27) \sum_{n=1}^{+\infty} \frac{\sqrt{n!}}{(\sqrt{n})^n} \quad \text{CONVERGE}$$

$$28) \sum_{n=1}^{+\infty} \frac{1}{\sqrt[n]{(n!)^2}} \quad \text{CONVERGE}$$

$$29) \sum_{n=1}^{+\infty} \frac{(n!)!}{n^{n^n}} \quad \text{CONVERGE}$$

$$30) \sum_{n=1}^{+\infty} \frac{(n!)^{n!}}{(n^n)!} \quad \text{CONVERGE}$$

$$31) \sum_{n=1}^{+\infty} \frac{1 + \cos n}{n} \quad \text{DIVERGE}$$

$$32) \sum_{n=1}^{+\infty} \left( e - \sum_{k=0}^n \frac{1}{k!} \right) \quad \text{CONVERGE}$$

$$33) \sum_{n=1}^{+\infty} \left( \sum_{k=n}^{+\infty} \frac{1}{k^k} \right) \quad \text{CONVERGE}$$

$$34) \sum_{n=1}^{+\infty} \left( \sum_{k=n}^{+\infty} \frac{1}{k^2} \right) \quad \text{DIVERGE}$$

Studiare, al variare del parametro reale  $a > 0$ , il carattere delle seguenti serie:

$$35) \sum_{n=1}^{+\infty} \left( 1 - \cos \frac{1}{n} \right)^a \quad \text{CONVERGE PER } a > \frac{1}{2}$$

$$36) \sum_{n=1}^{+\infty} \left( \frac{\pi}{2} - \arctan(n^a) \right) \quad \text{CONVERGE PER } a > 1$$

$$37) \sum_{n=1}^{+\infty} \left( \ln \left( \cos \frac{1}{\sqrt[n]{n}} \right) - \frac{1}{2\sqrt[n]{n}} + \frac{a}{n} \right) \quad \text{CONVERGE PER } a \neq \frac{1}{12}$$

$$38) \sum_{n=1}^{+\infty} \left( \cos \left( \sin \frac{1}{\sqrt[n]{n}} \right) - 1 + \frac{1}{2\sqrt[n]{n}} - \frac{a}{n} \right) \quad \text{CONVERGE PER } a \neq \frac{5}{24}$$

$$39) \sum_{n=1}^{+\infty} \frac{1}{a^{\ln n}} \quad \text{CONVERGE PER } a > e$$

$$40) \sum_{n=2}^{+\infty} \left( \frac{\log_2 4}{\log_4 n^n} \right)^a \quad \text{CONVERGE PER } a > \frac{1}{2}$$

$$41) \sum_{n=1}^{+\infty} \left( 1 - \frac{1}{n^3} \right)^{n^a} \quad \text{CONVERGE PER } a > 3$$

$$42) \sum_{n=1}^{+\infty} \frac{n!}{n^n} a^n \quad \text{CONVERGE PER } 0 < a < e$$

$$43) \sum_{n=3}^{+\infty} \frac{1}{n \cdot \ln n \cdot (\ln(\ln n))^a} \quad \text{CONVERGE PER } a > 1$$

$$44) \sum_{n=1}^{+\infty} \left( e - \left( 1 + \frac{1}{n} \right)^n \right)^a \quad \text{CONVERGE PER } a > 1$$

$$45) \sum_{n=1}^{+\infty} \left( e - \sum_{k=0}^n \frac{1}{k!} \right)^a \quad \text{CONVERGE PER } a > 0$$

$$46) \sum_{n=1}^{+\infty} \frac{1}{\sqrt[n]{(n!)^a}} \quad \text{CONVERGE PER } a > 1$$

$$47) \sum_{n=1}^{+\infty} \frac{1}{n^2} \left( \frac{n+2}{n+1} \right)^{a n \ln n} \quad \text{CONVERGE PER } 0 < a < 1$$

$$48) \sum_{n=1}^{+\infty} \left( \frac{n^2 + n - 1}{n^2 + 3n + 5} \right)^{n^a} \quad \text{CONVERGE PER } a > 1$$

$$49) \sum_{n=1}^{+\infty} \frac{n! \cdot n^{n+1}}{(2n)!} a^n \quad \text{CONVERGE PER } 0 < a < \frac{4}{e}$$

$$50) \sum_{n=1}^{+\infty} \frac{n^{2n}}{(2n)!} a^n \quad \text{CONVERGE PER } 0 < a < \frac{4}{e^2}$$