

ESERCITAZIONE di MATEMATICA GENERALE - CLEF

31/10/2024 - A.A. 2024/2025

Es. 1. Calcolare, se esistono, i seguenti limiti di successioni:

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| (1) $\lim_{n \rightarrow \infty} \left(\frac{2}{n} - \frac{6}{n+1} + \frac{4n}{n+2} \right);$ | (15) $\lim_{n \rightarrow \infty} \frac{5^n}{n^7 3^n};$ |
| (2) $\lim_{n \rightarrow \infty} \left(\frac{1}{n-n^2} - \frac{1}{n^2-n} \right);$ | (16) $\lim_{n \rightarrow \infty} \frac{7}{2+3e^{-n}};$ |
| (3) $\lim_{n \rightarrow \infty} \frac{2n^2+1}{n^2-1};$ | (17) $\lim_{n \rightarrow \infty} \left[\cos \left(\frac{1}{n} \right) - e^{-n} \right];$ |
| (4) $\lim_{n \rightarrow \infty} \frac{5n^3}{n^2+1};$ | (18) $\lim_{n \rightarrow \infty} \frac{\sin(n)}{n};$ |
| (5) $\lim_{n \rightarrow \infty} \frac{3n^3+2n^2-n+3}{2-n^2};$ | (19) $\lim_{n \rightarrow \infty} \frac{\cos(n)+3\sin(n)+1}{n^2+n+1};$ |
| (6) $\lim_{n \rightarrow \infty} \frac{3n^3+3n^4-5n^5-3}{3n^5-5n^2-8};$ | (20) $\lim_{n \rightarrow \infty} \frac{n-\cos(n)}{2n};$ |
| (7) $\lim_{n \rightarrow \infty} \left(\frac{n^2}{n+1} - \frac{n^2}{n-1} \right);$ | (21) $\lim_{n \rightarrow \infty} \frac{(-1)^n n}{2+n^2};$ |
| (8) $\lim_{n \rightarrow \infty} \frac{\sqrt{n}+\sqrt{2}}{n+2};$ | (22) $\lim_{n \rightarrow \infty} \frac{(-1)^n n^2}{2+n^2};$ |
| (9) $\lim_{n \rightarrow \infty} \frac{2\sqrt{n}-6n-n\sqrt{n}+7}{6-n};$ | (23) $\lim_{n \rightarrow \infty} \left(\frac{\sin(\pi n)e^n}{\pi n} + \frac{\cos(\pi n)}{\pi n} \right);$ |
| (10) $\lim_{n \rightarrow \infty} \left(\frac{4+\pi}{4-\pi} \right)^n;$ | (24) $\lim_{n \rightarrow \infty} (\sqrt{n} - \sqrt{n+1});$ |
| (11) $\lim_{n \rightarrow \infty} \frac{1+4^n}{3^n};$ | (25) $\lim_{n \rightarrow \infty} \sqrt[n]{3};$ |
| (12) $\lim_{n \rightarrow \infty} \frac{1-n^2+2^n}{3n-3^n};$ | (26) $\lim_{n \rightarrow \infty} \sqrt[n]{2^n + 5^n};$ |
| (13) $\lim_{n \rightarrow \infty} \frac{3+5^n+\log(n)}{3^{2n}};$ | (27) $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{2n} \right)^{3n};$ |
| (14) $\lim_{n \rightarrow \infty} \frac{3^n-e^n+3}{3^n};$ | (28) $\lim_{n \rightarrow \infty} \left(\frac{n+4}{n+3} \right)^n;$ |

Es. 2. Determinare se le seguenti serie convergono e, in caso affermativo, calcolare la loro somma.

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| (1) $\sum_{n=0}^{+\infty} \left(\frac{1}{3} \right)^n;$ | (4) $\sum_{n=0}^{+\infty} \frac{5^n}{\pi^n};$ |
| (2) $\sum_{n=0}^{+\infty} \left(-\frac{1}{2} \right)^n;$ | (5) $\sum_{n=0}^{+\infty} \frac{1+2^n}{3^n};$ |
| (3) $\sum_{n=1}^{+\infty} \left(\frac{1}{2} \right)^n;$ | (6) $\sum_{n=0}^{+\infty} \frac{3^{2n}}{4^n};$ |