

ESERCITAZIONE di MATEMATICA GENERALE - CLEF

Data: 30/10/2025 - A.A. 2025/2026

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

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

Esercizio 2. Determinare se le seguenti serie convergono e, in caso affermativo, calcolarne la somma.

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