

Esercizi sui limiti

- Calcolare i seguenti limiti:

$$\lim_{x \rightarrow +\infty} (1+x)^\alpha - x^\alpha \quad \text{con } \alpha \in \mathbb{R}$$

$$\lim_{x \rightarrow -\infty} \sqrt{4+x^2} + x$$

$$\lim_{x \rightarrow 0} \frac{(1+x)^\alpha - (1-x)^\alpha}{x} \quad \text{con } \alpha \in \mathbb{R}$$

$$\lim_{x \rightarrow 0^+} \frac{\log x}{\sqrt{1+2\log^2 x}}$$

$$\lim_{x \rightarrow -\infty} \frac{e^{3x} + 1}{e^{2x} + 2}$$

$$\lim_{x \rightarrow +\infty} \sqrt{x} + \sin x$$

$$\lim_{x \rightarrow +\infty} \frac{\sin x}{x^{1/3}}$$

$$\lim_{x \rightarrow +\infty} \frac{2x + \sin x}{3x + \cos x}$$

- Calcolare i seguenti limiti:

$$\lim_{x \rightarrow +\infty} \frac{(x^2 - 5x)(3 - e^{\sin x})}{1 + x}$$

$$\lim_{x \rightarrow 0} \sin x \sin(1/x)$$

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x}$$

$$\lim_{x \rightarrow 0} \frac{\sin x - \tan x}{x^2}$$

$$\lim_{x \rightarrow 0} \frac{5^x - 1}{x}$$

$$\lim_{x \rightarrow 0} \frac{1}{\tan x} - \frac{1}{\sin x}$$

$$\lim_{x \rightarrow 2} \frac{x - 2}{\log(x/2)}$$

- Calcolare i seguenti limiti:

$$\lim_{x \rightarrow 0} \frac{a^x - b^x}{x}$$

$$\lim_{x \rightarrow +\infty} x(\log(x+a) - \log(x+b))$$

$$\lim_{x \rightarrow 0^+} (\log^2 x)^{\sin x}$$

$$\lim_{x \rightarrow 0^+} (1 + e^{(x^{-3})})^{\sin x}$$

$$\lim_{x \rightarrow 0} \frac{x \cos^2 x - 2x \cos x + x}{3 \sin^3 x}$$

$$\lim_{x \rightarrow 0} \frac{\sqrt{\cos x} - 1}{\log^2(1+x)}$$

$$\lim_{x \rightarrow 0} \frac{\log(2/x)}{x^2 - 4x + 4}$$

$$\lim_{x \rightarrow 0^+} \frac{x \log^5 x + x^{1/4} \log x}{\sqrt{x}}$$

- Determinare α tale che

$$\lim_{x \rightarrow -\infty} \sqrt{x^2 - 1}(\sqrt{x^2 + \alpha} + x) = 2.$$

- Calcolare l'ordine di infinitesimo e la parte principale (per $x \rightarrow 0$) delle funzioni seguenti:

$$f(x) = e^{3x^4} - 1$$

$$f(x) = \log(\cos x)$$

$$f(x) = (1 - \cos x^\alpha)^\beta$$

$$f(x) = \sin(\pi\sqrt{1+x})$$

$$f(x) = \log(\sqrt{9+x} - 2)$$

$$f(x) = 1 - \frac{\sqrt{1+3x^2}}{1+2x}$$

$$f(x) = \log(x+a) - \log a$$