

Calcolo di limiti 2

Esercizio 1 (Funzioni razionali). Calcolare, se esistono, i seguenti limiti

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|----|--|---|---|
| a) | $\lim_{x \rightarrow 4} \frac{5}{2x - 6}$ | $\lim_{x \rightarrow 3^-} \frac{5}{2x - 6}$ | $\lim_{x \rightarrow -\infty} \frac{5}{2x - 6}$ |
| b) | $\lim_{x \rightarrow \frac{1}{3}} \frac{1 - 3x}{1 - x}$ | $\lim_{x \rightarrow 1^+} \frac{1 - 3x}{1 - x}$ | $\lim_{x \rightarrow +\infty} \frac{1 - 3x}{1 - x}$ |
| c) | $\lim_{x \rightarrow +\infty} \frac{x - 2}{x^2 - 3x}$ | $\lim_{x \rightarrow 3} \frac{x - 2}{x^2 - 3x}$ | $\lim_{x \rightarrow -\infty} \frac{x^2 - 3x}{x - 2}$ |
| d) | $\lim_{x \rightarrow 1} \frac{x^2 - x - 2}{x^2 - 2x}$ | $\lim_{x \rightarrow +\infty} \frac{x^2 - x - 2}{x^2 - 2x}$ | $\lim_{x \rightarrow -\infty} \frac{x^4 - 4x^3 + 5}{x^3 + 6x^2 + x}$ |
| e) | $\lim_{x \rightarrow +\infty} \frac{5x^6 - 3x^3}{(x^2 - 1)^3}$ | $\lim_{x \rightarrow +\infty} \frac{6x(x^3 + 3)(2x + 1)}{4x^4 - x^3 + 5}$ | $\lim_{x \rightarrow -\infty} \frac{4x^4 - x^3 + 5}{6x(x^3 + 3)(2x + 1)}$ |
| f) | $\lim_{x \rightarrow +\infty} \left(\frac{3x^2 + 2x + 1}{x^2 - 3x + 2} \right)^4$ | $\lim_{x \rightarrow +\infty} \left(\frac{2x^4 + 1}{x^4 - 1} \right)^{-2}$ | $\lim_{x \rightarrow 1} \frac{x^3}{(x - 1)^2}$ |
| g) | $\lim_{x \rightarrow 0} \frac{5x^2 + 4x}{x^3}$ | $\lim_{x \rightarrow 5} \frac{x^2 - 5x}{x^2 - 25}$ | $\lim_{x \rightarrow 0} \frac{2x^5 - x^3}{3x^4 + 2x^3}$ |
| h) | $\lim_{x \rightarrow 3} \frac{x^4 - 3x^3}{x^2 - 9}$ | $\lim_{x \rightarrow -3} \frac{x^2 - 3x}{x^2 - 9}$ | $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x^4 - 3x^3}$ |
| i) | $\lim_{x \rightarrow +\infty} 2^{\frac{x}{x+1}}$ | $\lim_{x \rightarrow +\infty} 2^{\frac{x^2}{x+1}}$ | $\lim_{x \rightarrow +\infty} 2^{\frac{x}{x^2+1}}$ |
| l) | $\lim_{x \rightarrow 2} e^{\frac{x}{x-2}}$ | $\lim_{x \rightarrow 1^+} \left(\frac{2}{3} \right)^{\frac{1}{2-2x}}$ | $\lim_{x \rightarrow +\infty} \frac{e^{x+5}}{e^{x-5}}$ |
| m) | $\lim_{x \rightarrow +\infty} \log(x^4 - 1) - \log(x - 1)$ | $\lim_{x \rightarrow +\infty} \log_{0,1}(x^4 - 1) - \log_{0,1}(x - 1)$ | |
| n) | $\lim_{x \rightarrow -\infty} \log 3x + 3 - 2 \log x + 1 $ | $\lim_{x \rightarrow -\infty} \log 3x + 3 - \frac{1}{2} \log x + 1 $ | |

Esercizio 2 (Funzioni irrazionali). Calcolare, se esistono, i seguenti limiti

$$\text{a) } \lim_{x \rightarrow +\infty} \sqrt{x+2} - \sqrt{x} \qquad \lim_{x \rightarrow +\infty} \frac{\sqrt{x+2} - \sqrt{x}}{x}$$

$$\text{b) } \lim_{x \rightarrow +\infty} \frac{x(\sqrt{4x^2+1} - 2x)}{5x-7} \qquad \lim_{x \rightarrow 4} \frac{2 - \sqrt{x}}{4-x}$$

$$\text{c) } \lim_{x \rightarrow 4^+} \frac{\sqrt{x^2-16}}{(x+4)(x-4)} \qquad \lim_{x \rightarrow 0^-} \frac{x}{\sqrt{x^2+1}-1}$$

$$\text{d) } \lim_{x \rightarrow 1^+} \frac{\sqrt{x-1}}{x^2-x} \qquad \lim_{x \rightarrow 1^+} \frac{(2-x)(x^2-x)}{\sqrt{x-1}}$$

$$\text{e) } \lim_{x \rightarrow 0} \frac{\sqrt[7]{x^9}}{x} \qquad \lim_{x \rightarrow 0} \frac{x\sqrt{x}}{\sqrt[3]{x}}$$