

# Esercitazione analisi 1

4-5/11/2025

**Esercizio 1** Calcolare i seguenti limiti

a)

$$\lim_{x \rightarrow +\infty} \ln x - \sqrt{x}$$

b)

$$\lim_{x \rightarrow 3} \frac{x^3 - 3x^2 + 3x - 9}{x^2 + 2x - 15}$$

c)

$$\lim_{x \rightarrow 3} \frac{\sqrt{7-x} - 2}{2x - 6}$$

d)

$$\lim_{x \rightarrow 8} \frac{x - 8}{\sqrt[3]{x} - 2}$$

e)

$$\lim_{x \rightarrow +\infty} \frac{\sqrt{4x^2 + x + 6}}{x + 2}$$

f)

$$\lim_{x \rightarrow -\infty} \frac{\sqrt{4x^2 + x + 6}}{x + 2}$$

g)

$$\lim_{x \rightarrow -\infty} \frac{\sqrt{4x^2 - 5} - \sqrt{x^2 + 1}}{2x}$$

h)

$$\lim_{x \rightarrow 0} \frac{1 - 2 \cos x + \cos^2 x}{x^4}$$

i)

$$\lim_{x \rightarrow 0} \frac{x}{\cos 2x - \cos x}$$

j)

$$\lim_{x \rightarrow -2} \frac{x^4 - 3x^2 + 5x + 6}{x^3 - 3x^2 - 8x + 4}$$

k)

$$\lim_{x \rightarrow 0} \frac{\sqrt{2x+1} - \sqrt{3x+1}}{\sqrt{x^2+16} - 2\sqrt{x+4}}$$

l)

$$\lim_{x \rightarrow 0} \frac{\sin 3x \cdot \sin 7x}{\sin x^2}$$

m)

$$\lim_{x \rightarrow \frac{\pi}{6}} \frac{2 \sin x - 1}{2 \cos x - \sqrt{3}}$$

n)

$$\lim_{x \rightarrow 0} \frac{x^3}{\tan x - \sin x}$$

o)

$$\lim_{x \rightarrow 0^+} \frac{\ln x - 7}{\ln^3 x + \ln^2 x - 5 \ln x + 2}$$

p)

$$\lim_{x \rightarrow 2} \frac{\ln(x-1)}{x-2}$$

q)

$$\lim_{x \rightarrow 0} \frac{e^x - e^{2x}}{\ln(1+3x)}$$

r)

$$\lim_{x \rightarrow 0} \frac{\ln(x+e^3) - 3}{x}$$

s)

$$\lim_{x \rightarrow +\infty} \left(1 + \frac{3}{2x}\right)^{x-1}$$

t)

$$\lim_{x \rightarrow +\infty} \left(\frac{2x-1}{2x+3}\right)^{x+1}$$

u)

$$\lim_{x \rightarrow 0^+} x^{\frac{1}{1+3 \ln x}}$$

v)

$$\lim_{x \rightarrow 0} \frac{\sqrt[3]{1+2x} - 1}{e^{3x} - 1}$$

w)

$$\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin x - \cos x}{\tan\left(\frac{\pi}{8} - \frac{x}{2}\right)}$$

x)

$$\lim_{x \rightarrow +\infty} \left(\frac{x+3}{x+2}\right)^x$$

y)

$$\lim_{x \rightarrow 0} \frac{(1+3x)^5 - 1}{x}$$

z)

$$\lim_{x \rightarrow \infty} \frac{2x + \cos x}{7x}$$

**Esercizio 2** Determina  $k$  in modo che

$$\lim_{x \rightarrow 0} \frac{\sin kx + x}{\sin kx + 5x} = 3$$

**Esercizio 3** Determina  $k > 0$  tale che

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