

# Analisi Matematica 1 - Lista n. 15

Limiti da fare con gli sviluppi di Taylor

Titolo nota

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Calcolare i seguenti limiti:

$$1) \lim_{x \rightarrow 0} \frac{\ln(1+x^2) - x \operatorname{arctan} x}{\sin^2(x^2)}$$

$$2) \lim_{x \rightarrow 0} \frac{\ln\left(1 + \frac{x}{2}\right) - \sqrt{1+x} + 1}{2 \cdot (\tan x - \sin x)}$$

$$3) \lim_{x \rightarrow 0^+} \frac{\sqrt{1+2x} - \sqrt{x} \operatorname{arctan} \sqrt{x} - 1}{\tan(x^2)}$$

$$4) \lim_{x \rightarrow 0} \frac{3 \sin x - 3x \cos x}{\ln(1+3x) - 3 \ln(1+x) + 3x^2}$$

$$5) \lim_{x \rightarrow 0} \frac{(x - \operatorname{arctan} x) \left( \ln(1+x^2) - x \cdot \operatorname{arctan} x \right) + \frac{x^2}{18}}{x^3 - \sin x^3}$$

$$6) \lim_{x \rightarrow 0} \frac{(e^{2x} - 1 - \sin 2x) (3x e^x - \operatorname{arctan}(3x)) - 6x^4 - 29x^5}{x^6}$$

$$7) \lim_{x \rightarrow 0} \frac{(e^x - 1 - \ln(1+x)) (3x e^x - \sin(3x)) - 3x^4 - \frac{11}{2} x^5}{x^6}$$

$$8) \lim_{x \rightarrow 0} \frac{3 \sin x - 3x \cos x}{\frac{1}{1-x} - e^x - \frac{x^2}{2}}$$

$$9) \lim_{x \rightarrow 0} \frac{3 \sin x - \sqrt{3} \sin(x\sqrt{3})}{\operatorname{arctan} x - \operatorname{arctan} 2x + x}$$

$$10) \lim_{x \rightarrow 0} \frac{2x^5 + x^7 \cos \frac{1}{x}}{\sin x \cdot \cos x + \frac{2}{3} x^3 - x}$$

$$11) \lim_{x \rightarrow 0} \frac{\cos x - 1 + e^{-\frac{1}{x^2}}}{\cos \sqrt{x} - \sqrt{1-x+x^2}}$$

$$12) \lim_{x \rightarrow 0} \frac{x^8 - (x+x^2)^5}{x \sqrt{1+2x^2} + \cos(x^3+x^4) - x - \sqrt{1+2x^3}}$$

$$13) \lim_{x \rightarrow 0} \frac{\sin x - x \cos\left(-\frac{x}{\sqrt{3}}\right)}{-\tan x^5}$$

$$14) \lim_{x \rightarrow 0} \frac{\left(\cos x - \frac{1}{1-x^2}\right) \operatorname{arctan} x + \frac{3}{2} x^3}{2\sqrt{1-x^5} - 2}$$

$$15) \lim_{x \rightarrow 0} \frac{(x \cos x - \sin x)(x^2 - \sin x^2) + \frac{1}{18} x^9}{x^{11}}$$

$$16) \lim_{x \rightarrow 0} \frac{(\operatorname{arctan} x - x \cos x)(\sqrt{1+x^4} - 1) - \frac{1}{12} x^7}{x^9}$$

$$17) \lim_{x \rightarrow +\infty} \frac{x^4 \sin \frac{1}{x^3} - 2x^3 \left(1 - \cos \frac{1}{x}\right)}{x e^{\frac{1}{x^2}} - x - \ln(x+1) + \ln x}$$

$$18) \lim_{x \rightarrow +\infty} \left( \frac{x^3}{x+2} e^{\frac{x}{x^2+2}} - x^2 + x \right)$$

$$19) \lim_{x \rightarrow \frac{\pi}{6}} \left( e^{\sin x + \frac{1}{2}} - \left(\frac{6}{\pi} x\right)^{\frac{\pi}{4\sqrt{3}}} \cdot e \right) \tan^2(3x)$$

$$20) \lim_{x \rightarrow 0} \frac{\ln(\cos 2x) + 2x^2 + \frac{4}{3} x^4}{x^6}$$

$$21) \lim_{x \rightarrow +\infty} \left( \operatorname{arctan} x - \frac{\pi}{2} + \frac{1}{x} - \frac{1}{3x^3} \right) \cdot x^\alpha \quad \text{al variare di } \alpha > 0$$

$$22) \lim_{x \rightarrow 0^+} \frac{e^{-\frac{1}{x^2}} + 2 - \cos(x - \sin x) - \sqrt[22]{1+x^6}}{x^\alpha} \quad \text{al variare di } \alpha > 0$$

$$23) \lim_{x \rightarrow 0^+} \frac{\sin(\operatorname{arctan} x) - \operatorname{arctan}(\sin x)}{x^\alpha} \quad \text{al variare di } \alpha > 0$$

$$24) \lim_{x \rightarrow 0^+} \frac{\sin(\sin x) - 2 \sin x + x}{x^\alpha} \quad \text{al variare di } \alpha > 0$$

$$25) \lim_{x \rightarrow 0^+} \frac{\sin(\sin(\sin(\sin x))) - 4 \sin(\sin(\sin x)) + 6 \sin(\sin x) - 4 \sin x + x}{x^\alpha} \quad \text{al variare di } \alpha > 0$$

$$26) \lim_{x \rightarrow 0^+} \frac{x^\alpha - \cos x - x \ln x}{x^\alpha \cdot |\ln x|^\beta} \quad \text{al variare di } \alpha > 0 \text{ e } \beta > 0$$