Formulario di analisi matematica 1
Limiti notevoli

QUANDO Xn TENDE ZERO.

Limiti notevoli trigonometrici

$$\lim_{x_n \to 0} \frac{\sin x_n}{x_n} = 1 \qquad \lim_{x_n \to 0} \frac{\sin(m \cdot x_n)}{p \cdot x_n} = \frac{m}{p} \qquad \lim_{x_n \to 0} x_n \sin\left(\frac{1}{x_n}\right) = 0$$

$$\lim_{x_n \to 0} \frac{x_n}{\sin x_n} = 1 \qquad \lim_{x_n \to 0} x_x^2 \sin^2\left(\frac{\pi}{x_n}\right) = 0 \qquad \lim_{x_n \to 0} \frac{1-\cos(2x_n)}{2x_n} = 1$$

$$\lim_{x_n \to 0} \frac{1-\cos(x_n)}{x_n} = 0 \qquad \lim_{x_n \to 0} \frac{1-\cos^2(x_n)}{x_n^2} = 1 \qquad \lim_{x_n \to 0} \frac{1-\cos^\alpha(x_n)}{x_n^\beta} = \frac{\alpha}{\beta}$$

$$\lim_{x_n \to 0} \frac{1-\cos(x_n)}{x_n^2} = \frac{1}{2} \qquad \lim_{x_n \to 0} \frac{x_n^2}{1-\cos(x_n)} = 2 \qquad \lim_{x_n \to 0} \frac{\cos\left(\frac{\pi(1-x_n)}{2}\right)}{x_n} = \frac{\pi}{2}$$

$$\lim_{x_n \to 0} \frac{\tan(x_n)}{x_n} = 1 \qquad \lim_{x_n \to 0} \frac{x_n^2}{\cos(x_n) - e^{x_n^2}} = -\frac{2}{3} \qquad \lim_{x_n \to 0} \frac{1-\cos(2x_n)}{x_n^2} = 2$$

$$\lim_{x_n \to 0} \frac{\arcsin(x_n)}{x_n} = 1 \qquad \lim_{x_n \to 0} \frac{\arctan(x_n)}{x_n} = 1$$

Limiti notevoli con il logaritmo

$$\lim_{x_n \to 0} \frac{\ln x_n}{\ln x_n} = 0 \qquad \lim_{x_n \to 0} \frac{x_n}{\ln(1+x_n)} = 1 \qquad \lim_{x_n \to 0} \frac{\log(1+x_n)}{x_n} = 1$$

$$\lim_{x_n \to 0} \frac{\log(1+\alpha x_n)}{x_n} = \alpha \qquad \lim_{x_n \to 0} x_n^\beta \ln x_n^\alpha = 0 \quad \forall \alpha \in \Re, \forall \beta > 0$$

$$\lim_{x_n \to 0} \frac{\log_a(1+x_n)}{x_n} = \frac{1}{\ln a} \qquad \lim_{x_n \to 0} \frac{\ln(2+\cos x_n)}{x_n^2} = \frac{1}{2}$$

Limiti notevoli di rapporti

$$\lim_{x_n \to 0} (1+x_n)^{\frac{1}{x_n}} = e \qquad \lim_{x_n \to 0} \frac{(1-x_n)^k - 1}{x_n} = -k$$

$$\lim_{x_n \to 0} \frac{A^{x_n} - B^{x_n}}{x_n} = \ln \frac{A}{B} \qquad \lim_{x_n \to 0} \frac{a^{x_n} - 1}{x_n} = \log a$$

$$\lim_{x_n \to 0} \frac{(1+x_n^{\alpha}) \;\; -1}{x_n} = \alpha \qquad \lim_{x_n \to 0} \frac{(1+x_n)^k - 1}{x_n} = k$$

$$\lim_{x_n \to 0} \frac{x_n}{1-e^{x_n}} = -1 \qquad \lim_{x_n \to 0} \frac{e^{\alpha x_n} - 1}{x_n} = 1$$ anche il limite dell’inverso è uguale a 1

QUANDO Xn TENDE AD INFINITO

$$\lim_{x_n \to \infty} \frac{\sin x_n}{x_n} = 0 \qquad \lim_{x_n \to \infty} \frac{\cos x_n}{x_n} = 0 \qquad \lim_{x_n \to \infty} \frac{\arctan(x_n)}{x_n} = 0$$

$$\lim_{x_n \to \infty} \frac{\ln^{\alpha} x_n}{x_n^{\beta}} = 0 \qquad \lim_{x_n \to \infty} \frac{e^{x_n}}{x_n^{\beta}} = +\infty \qquad \lim_{x_n \to \infty} \left(1+\frac{1}{x_n}\right)^{x_n^2} = +\infty$$

$$\lim_{x_n \to \infty} \left(1+\frac{1}{x_n}\right)^{\sqrt{x_n}} = 1 \qquad \lim_{x_n \to \infty} \left(1+\frac{1}{x_n}\right)^{\alpha x_n} = e^{\alpha} \qquad \lim_{x_n \to \infty} \ln x_n = \text{non esiste}$$

$$\lim_{x_n \to \infty}\left(1+\frac{1}{2x_n}\right)^{x_n} = \sqrt{e} \qquad \lim_{x_n \to \infty}\left(1-\frac{3}{x_n}\right)^{x_n} = \frac{1}{e^3}$$

Limiti di successioni per n tendente ad infinito

$$\lim_{n\to\infty}\log\left[e^n+1\right] = +\infty \qquad \lim_{n\to\infty}\frac{\log\left[\frac{1}{e^n}+1\right]}{n} = 1 \qquad \lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n = e$$

$$\lim_{n\to\infty}\frac{\log n}{n} = 0 \qquad \lim_{n\to\infty}\left(1-\frac{3}{n}\right)^n = e^{-3} \qquad \lim_{n\to\infty}\frac{n^n}{n!} = +\infty$$

$$\lim_{n\to\infty}\frac{\sqrt[n]{n!}}{n} = \frac{1}{e} \qquad \lim_{n\to\infty}\frac{\sqrt[\alpha n]{n!}}{n} = 0 \quad \alpha > 1$$

$$\lim_{n\to\infty}\sqrt[n]{\sqrt{n}} = 1 \qquad \lim_{n\to\infty}\frac{n!}{n^n} = 0 \qquad \lim_{n\to\infty}\left(n-\sqrt{n}\right) = +\infty$$

$$\lim_{n\to\infty}\sqrt[n]{\frac{n^n}{n!}} = e \qquad \lim_{n\to\infty}\sqrt[n]{n} = 1 \qquad \lim_{n\to\infty}\frac{\ln n!}{n\ln n} = 1$$

$$\lim_{n\to\infty}\frac{\sum\left(\sqrt[n]{n}\right)}{n} = 1$$