Limiti 14

Argomenti: limiti di funzioni e successioni **Difficoltà**: ⋆⋆⋆⋆⋆

Prerequisiti: tutte le tecniche per il calcolo di limiti

Calcolare i seguenti limiti di funzione.

Funzione	Limite	Successione	Limite
$\displaystyle\lim_{x\to+\infty}\left(x^2\sin\frac{1}{x}-\frac{x^2}{x+1}\right)$	1	$\displaystyle\lim_{x\to+\infty} e^x\left(\log(e^x+1)-x\right)$	1
$\displaystyle\lim_{x\to0}\frac{\cos(\arctan x)-\cosh(\arctan x)}{\sinh^2(\sqrt{x})\cdot\tan^2(\sqrt{x})}$	-1	$\displaystyle\lim_{x\to0}\left[1-\left(\frac{\sin x}{x}\right)^{x^2}\right]\cdot\frac{1}{x^4}$	$1/6$
$\displaystyle\lim_{x\to0}\frac{\arctan(\cos x)-\arctan(\cosh x)}{\sinh^2(\sqrt{x})\cdot\tan^2(\sqrt{x})}$	$-1/2$	$\displaystyle\lim_{x\to0}\frac{\arctan(x^5)-\arctan^5 x}{x^7}$	$5/3$
$\displaystyle\lim_{x\to0}\frac{\cos(\cosh x)-\cos(\sqrt{1+x^2})}{\cosh(\cos x)-\cosh(\sqrt{1-x^2})}$	$-\frac{\sin 1}{\sinh 1}$	$\displaystyle\lim_{x\to0}\left[\tan\left(\frac{\arccos x}{2}\right)\right]^{1/x}$	-1

Calcolare i limiti delle seguenti successioni.

Successione	Limite	Successione	Limite
$\sin^n(\cos(n!+3^n))$	0	$\displaystyle\frac{n^{n^e}-e^{e^n}}{e^{n^e}-n^{e^n}}$	0
$n^2\left(\arctan(n+1)-\arctan n\right)$	1	$\displaystyle n\left(\sin\frac{n+5}{n+1}-\sin\frac{n+1}{n+5}\right)$	$8\cdot\cos 1$
$\left[\sqrt{n+1}+\sqrt{4n+1}-3\sqrt{n}\right]^{1/\log n}$	$1/\sqrt{e}$	$\displaystyle\frac{\sqrt[n]{(n+1)!}-\sqrt[n]{n!}}{\log n}$	$\frac{1}{e}$
$\displaystyle n\left(\arcsin\frac{n-1}{n}-\arcsin\frac{n-2}{n}\right)$	$+\infty$	$\displaystyle\sqrt{n}\left[\sqrt{\pi}-\sqrt{\arccos\frac{1-n}{n}}\right]$	$1/\sqrt{2\pi}$
$\displaystyle n^2\left(\sqrt[4]{\frac{2n^2+3}{n^2+1}}-\sqrt[4]{\frac{2n^3+3}{n^3+1}}\right)$	$\frac{1}{4\cdot 2^{\frac{3}{4}}}$	$\displaystyle n\left[\sqrt[n]{\binom{3n}{n+1}}-\sqrt[n]{\binom{3n}{n}}\right]$	$27/2$
$\displaystyle n^4\left(\sqrt[4]{\frac{16n^2-8}{n^2+2}}-\sqrt[3]{\frac{8n^2+1}{n^2+2}}\right)$	$-\frac{25}{64}$	$\displaystyle n\sin\left(\frac{n!+1}{n}\pi\right)$	π

$\boxed{\text{Lagrange + Carabinieri}}$

?

$$\frac{\sqrt{n}}{2(1-\sqrt{2})}\cdot\left[\sin^{-1}\left(\frac{n-1}{n}\right)-\sin^{-1}\left(\frac{n-2}{n}\right)\right]$$
$\downarrow$
1

[to be completed, tanto alla cattiveria non c'e' limite]