ESERCIZI SUI LIMITI DI SUCCESSIONI

Nicola Arcozzi

September 30, 2006

Analisi Matematica L-A

Calcolare i seguenti limiti di successioni

$$\lim_{n\to\infty}(1-(-1)^n)\sin(1/n) \tag{1}$$

$$\lim_{n\to\infty}(\sqrt{2n+1}-\sqrt{n-2}) \tag{2}$$

$$\lim_{n\to\infty}(\sqrt{n^2+2n}-\sqrt{n^2-n+4}) \tag{3}$$

$$\lim_{n\to\infty}(2-3e^{-n})\sqrt{n}(\sqrt{n+2}-\sqrt{n-2}) \tag{4}$$

$$\lim_{n\to\infty}\frac{\sqrt{2n+11}-\sqrt{2n+4}}{\sqrt{n^2+2}-\sqrt{n^2-1}} \tag{5}$$

$$\lim_{n\to\infty}\frac{\sqrt{2n+11}-\sqrt{2n+4}}{\sqrt{n^2+2n}-\sqrt{n^2-n}} \tag{6}$$

$$\lim_{n\to\infty}\frac{\sqrt{2n+11}-\sqrt{2n+4}}{\sqrt{n^2+2\sqrt{n}}-\sqrt{n^2-\sqrt{n}}} \tag{7}$$

$$\lim_{n\to\infty}(1+\cos(n)/n)(1-\cos(1)) \tag{8}$$

$$\lim_{n\to\infty}\left(\frac{n+1}{n-1}\right)^{n+3} \tag{9}$$

$$\lim_{n\to\infty}\frac{n^5-3n^3+2}{1-3n^4+2n^8} \tag{10}$$

$$\lim_{n\to\infty}\cos\left(\frac{\pi n}{3n+1}\right)\frac{n^2-3n+2}{1-3n+2n^2} \tag{11}$$

$$\lim_{n\to\infty}\frac{2^n+n^2-\log^{12}(n)}{3^n-n\sqrt{n}+5} \tag{12}$$

$$\lim_{n\to\infty}\left(\frac{2^n+n^2-\log^{12}(n)}{3^n-n\sqrt{n}+5}\right)^{1/n} \tag{13}$$

$$\lim_{n\to\infty}\left(\frac{2^n+n^2-\log^{12}(n)}{3^n-n\sqrt{n}+5}\right)^{1/n^2} \tag{14}$$

Soluzioni. (1) 0; (2) $+\infty$; (3) 3/2; (4) 4; (5) $+\infty$; (6) 0; (7) $\frac{7}{6}\sqrt{2}$; (8) $1-\cos(1)$; (9) e^2; (10) 0; (11) 1/4; (12) 0; (13) 2/3; (14) 1.

Calcolare

$$\lim_{n\to\infty} a_n$$

dove $a_n =$

(1) $\frac{2^n}{3^n}$	(2) $\frac{(\log n)^2}{\sqrt{n}}$	(3) $\frac{\log n}{2^n}$	(4) $\frac{n\log n}{2^n}$
(5) $\frac{n2^n}{3^n}$	(6) $\frac{n^{1/10}}{(\log n)^{10}}$	(7) $\frac{2^{2n}}{3^n}$	(8) $\frac{n^{100}}{2^{\frac{n}{10}}}$
(9) $\frac{3n+n^2}{2n^2+1}$	(10) $\frac{n}{n^2+1}$	(11) $\frac{(\log n)^2-n}{\sqrt{n}+1}$	(12) $\frac{n^3-2n+n^2}{n-3n^2-2n^3}$
(13) $\frac{\log(n^2)+1}{\log(n)}$	(14) $\frac{\log(3^n+n^2)}{n}$	(15) $\frac{n-\log(n)}{\sqrt{n}-2n}$	(16) $\frac{2^n-4n^4}{3\cdot 2^n+n^5}$
(17) $\frac{n^2-3n\log(n)}{\log(n)-n^2}$	(18) $\frac{\sqrt[3]{1+1/n}-1}{1/n}$	(19) $\frac{e^{1/n}-1}{1/n}$	(20) $n\log(1/n)$

Soluzioni.

(1) 0	(2) 0	(3) 0	(4) 0
(5) 0	(6) ∞	(7) ∞	(8) 0
(9) 1/2	(10) 0	(11) $-\infty$	(12) $-1/2$
(13) 2	(14) $\log 3$	(15) $-1/2$	(16) 1/3
(17) -1	(18) 1/3	(19) 1	(20) $-\infty$