## Calcolo di limiti di successioni

| Giustificare tutti i passaggi mediante la teoria studiata. |
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1. Usando i teoremi algebrici e di confronto, calcolare

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

ove

(a) $a_n = \dfrac{n^3+2n}{1-5n+3n^3}$ ;

(b) $a_n = \dfrac{2-n}{1+n^2}$ ;

(c) $a_n = \dfrac{n-n^5+6}{n^2+8}$ ;

(d) $a_n = \dfrac{\cos(\log n + n!)}{n^2}$ ;

(e) $a_n = n - \sqrt{n}\cos n^2$ ;

(f) $a_n = \dfrac{\operatorname{sen} n + \sqrt{n}}{n}$ ;

(g) $a_n = \dfrac{2^n - n + n!}{n^3}$ ;

(h) $a_n = \dfrac{3^n + (-2)^n}{5^n + (-2)^n}$ ;

(i) $a_n = \dfrac{6^n + (-1)^n}{3^n + \operatorname{sen} n}$ ;

(j) $a_n = \dfrac{n \operatorname{sen} n^2 + n^2 \operatorname{sen} n}{(n+1)\sqrt{n^3}}$ ;

(k) $a_n = n - \dfrac{n^2+1}{n+2}$ ;

(l) $a_n = \dfrac{\sqrt[3]{n} - \sqrt{n}}{2 + \operatorname{sen} n^2}$ ;

(m) $a_n = \dfrac{\cos n + \operatorname{sen} n}{n^2}$ ;

(n) $a_n = \dfrac{\sqrt[4]{n} - \sqrt[5]{n}}{\sqrt[6]{n} - \sqrt[7]{n}}$ ;

(o) $a_n = \dfrac{\sqrt[4]{n} - n\sqrt[5]{n}}{\sqrt[6]{n} - n\sqrt[7]{n}}$;

(p) $a_n = \dfrac{\log n + \sqrt[3]{n}}{n^n + \cos n + 2^n}$.

**Soluzioni:** (a) 1/3; (b) 0; (c) $-\infty$; (d) 0; (e) $+\infty$; (f) 0; (g) $+\infty$; (h) 0; (i) $+\infty$; (j) 0; (k) 2; (l) $-\infty$; (m) 0; (n) $+\infty$; (o) $+\infty$; (p) 0.

2. Usando i teoremi algebrici, i criteri del rapporto, della radice, del rapporto $\to$ radice, calcolare
$$\lim_{n\to+\infty} a_n$$
ove

(a) $a_n = \dfrac{2^n}{n^3}$;

(b) $a_n = \dfrac{3^n}{n!}$;

(c) $a_n = \dfrac{n! \cdot 3^n}{n^n}$;

(d) $a_n = \dfrac{n! \cdot 2^n}{n^n}$;

(e) $a_n = \sqrt[n]{\dfrac{n!}{n^3}}$;

(f) $a_n = \dfrac{1}{2^n}\left(1 + \dfrac{1}{n}\right)^{n^2}$;

(g) $a_n = \dfrac{1}{4^n}\left(1 + \dfrac{1}{n}\right)^{n^2}$;

(h) $a_n = \dfrac{2^{n^2}}{n^n}$;

(i) $a_n = \sqrt[n]{n!}$;

(j) $a_n = \dfrac{\sqrt[n]{n!}}{n}$;

(k) $a_n = \sqrt[n]{n^2 + 2n + 6}$;

(l) $a_n = \sqrt[n]{3^n + n^2 + 6n + 3}$;

(m) $a_n = \sqrt[n]{n^3 + n\log n}$;

(n) $a_n = \sqrt[n]{n^n + \log n}$;

(o) $a_n = \sqrt[n]{2^n + n^3}$;

(p) $a_n = \dfrac{n! \cdot 3^n}{n^{2n}}$ .

**Soluzioni:** (a) $+\infty$; (b) 0; (c) $+\infty$; (d) 0; (e) $+\infty$; (f) $+\infty$; (g) 0; (h) $+\infty$; (i) $+\infty$; (j) $1/e$; (k) 1; (l) 3; (m) 1; (n) $+\infty$; (o) 2; (p) 0.