

## Calcolo e verifica di limiti di funzioni

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Gli esercizi sono proposti in ordine di difficoltà crescente.

**nota:** in un file così lungo e complesso può accadere che sia presente un errore di diversa natura nonostante gli esercizi siano stati controllati più volte. Saremo grati di ricevere segnalazioni di eventuali refusi o suggerimenti di qualsiasi natura.

calcola i seguenti limiti di forma determinata utilizzando la sostituzione e l'algebra classica



1	$\lim_{x \rightarrow 1} (x - 1)$	0
2	$\lim_{x \rightarrow 0} (3 - x)$	3
3	$\lim_{x \rightarrow 2} (2x + 5)$	9
4	$\lim_{x \rightarrow -2} (2x + 5)$	1
5	$\lim_{x \rightarrow 3} (2x + 1)$	7
6	$\lim_{x \rightarrow 0} (1 - 3x)$	1
7	$\lim_{x \rightarrow -3} (5x - 7)$	-22
8	$\lim_{x \rightarrow -4} (11x - 14)$	-58
9	$\lim_{x \rightarrow 3} (x^2 - 2)$	7
10	$\lim_{x \rightarrow -1} (4 - 4x^2)$	0
11	$\lim_{x \rightarrow 0} (x^4 - x^2)$	0
12	$\lim_{x \rightarrow 2} (2x^3 + x^2 - 3x - 1)$	13
13	$\lim_{x \rightarrow -1} (-x^3 + 2x^2 - 4)$	-1

14	$\lim_{x \rightarrow 10} \frac{2x + 10}{6}$	5
15	$\lim_{x \rightarrow 2} \frac{1}{x}$	$\frac{1}{2}$
16	$\lim_{x \rightarrow -3} \frac{1}{x}$	$-\frac{1}{3}$
17	$\lim_{x \rightarrow -1} \frac{1}{x^4}$	1
18	$\lim_{x \rightarrow -3} \frac{x^2 - 1}{x - 2}$	$-\frac{8}{5}$
19	$\lim_{x \rightarrow 2} \frac{2x^2 - x - 1}{3x - 1}$	1
20	$\lim_{x \rightarrow 1} \frac{x^2 - 7x + 1}{5x - 2}$	$-\frac{5}{3}$
21	$\lim_{x \rightarrow 1} \frac{x^3 - 1}{x + 5}$	0
22	$\lim_{x \rightarrow 2} \frac{4 - x^2}{x^3 + 2x^2 - 3x - 4}$	0
23	$\lim_{x \rightarrow 3} \frac{x^4 - 6x^3 - 3}{x^3 - 3}$	$-\frac{7}{2}$
24	$\lim_{x \rightarrow 2} \sqrt{12 + x^2}$	4
25	$\lim_{x \rightarrow 3} \frac{3 - x^2}{\sqrt{3} - x}$	$\sqrt{3} + 3$
26	$\lim_{x \rightarrow 4} \sqrt{2x + 1}$	3

27	$\lim_{x \rightarrow 0} e^x$	1
28	$\lim_{x \rightarrow 0} \ln \frac{x+3}{2x+1}$	$\ln 3$
29	$\lim_{x \rightarrow 3} \left( \frac{3+x}{x+2} \right)^{x-3}$	1
30	$\lim_{x \rightarrow 0} \log_2 \sqrt{\left(\frac{1}{3}\right)^x + 3}$	1
31	$\lim_{x \rightarrow 0} \frac{e^{x+3}}{e^{-x} + e^x}$	$\frac{e^3}{2}$
32	$\lim_{x \rightarrow 0} \sqrt{\frac{3^x + 2}{\left(\frac{1}{3}\right)^x + 1}}$	$\frac{\sqrt{6}}{2}$
33	$\lim_{x \rightarrow 0} \frac{3^x + 1}{\log_3(x+3)}$	2
34	$\lim_{x \rightarrow 1} (e^{2x-1} - e)$	0
35	$\lim_{x \rightarrow 0} \frac{e^{\sin x} - 1}{\cos x + 2}$	0
36	$\lim_{x \rightarrow \frac{\pi}{2}} \sin x + \cos x$	1
37	$\lim_{x \rightarrow \pi} \frac{\cos x + 2}{\sqrt{\sin x + 4}}$	$\pi$
38	$\lim_{x \rightarrow \frac{\pi}{6}} \frac{\tan x \cos x}{2}$	$\frac{1}{4}$

calcola i seguenti limiti di forma determinata utilizzando anche l'algebra dei limiti, i grafici e i limiti delle funzioni elementari 

39	$\lim_{x \rightarrow +\infty} (4x - 7)$	$+\infty$
40	$\lim_{x \rightarrow -\infty} (5x - 1)$	$-\infty$
41	$\lim_{x \rightarrow 0} \frac{1}{x^4}$	$+\infty$
42	$\lim_{x \rightarrow 1^+} \frac{x + 5}{x^3 - 1}$	$+\infty$
43	$\lim_{x \rightarrow 1} \frac{x^2 + x + 1}{x^2 - 2x + 2}$	3
44	$\lim_{x \rightarrow \frac{1}{4}^+} \frac{6x^2 - 2x + 1}{4x - 1}$	$+\infty$
45	$\lim_{x \rightarrow \frac{1}{4}^+} \frac{6x^2 - 2x + 1}{1 - 4x}$	$-\infty$
46	$\lim_{x \rightarrow -1^+} \frac{3}{x + 1}$	$+\infty$
47	$\lim_{x \rightarrow -\infty} \left(x + \frac{3}{x}\right)$	$-\infty$
48	$\lim_{x \rightarrow -\infty} \frac{1}{9 - 6x}$	0
49	$\lim_{x \rightarrow 2} \frac{2x^2 - x + 1}{2^{2x} - 2^x + 2}$	$\frac{1}{2}$

50	$\lim_{x \rightarrow -\infty} e^{x-\pi} - 62$	0
51	$\lim_{x \rightarrow -\infty} e^{x+5}$	0
52	$\lim_{x \rightarrow 1^+} \frac{5}{3^x - 3}$	$+\infty$
53	$\lim_{x \rightarrow -\infty} (e^{x+2} + e^{2x})$	0
54	$\lim_{x \rightarrow +\infty} \left(\frac{1}{5}\right)^{x+3}$	0
55	$\lim_{x \rightarrow +\infty} \frac{e^x + e^{-x}}{3e^{-x}}$	$+\infty$
56	$\lim_{x \rightarrow 3^+} \log_2(x - 3)$	$+\infty$
57	$\lim_{x \rightarrow -3} \log_3(6 - x)$	2
58	$\lim_{x \rightarrow +\infty} \ln\left(1 + \frac{3}{x}\right)$	0
59	$\lim_{x \rightarrow +\infty} \sqrt{\ln\left(1 + \frac{5}{x}\right)}$	0
60	$\lim_{x \rightarrow 1} \frac{2x - 1}{\log_2 x - 2}$	$-\frac{1}{2}$

61	$\lim_{x \rightarrow \frac{\pi}{6}} (2 \cos x - \sqrt{3})$	0
62	$\lim_{x \rightarrow \frac{\pi}{2}} \frac{2 \sin x + 3}{2 \cos x}$	$+\infty$
63	$\lim_{x \rightarrow \frac{\pi}{2}} \frac{\sin x + 2 \cos x}{2x}$	$\frac{1}{\pi}$
64	$\lim_{x \rightarrow \pi^-} \frac{2 \cos x + 1}{\sin x}$	$-\infty$
65	$\lim_{x \rightarrow 0^+} \left( \frac{3 \sin x}{\ln 3x} + \frac{2}{\cos 2x} \right)$	2
66	$\lim_{x \rightarrow \frac{\pi}{2}} \frac{5 \sin x + 1}{2 \tan x - 1}$	0
67	$\lim_{x \rightarrow \frac{\pi}{4}^+} \frac{8 \cos x + 2 \sin x}{\cot x - 1}$	$-\infty$
68	$\lim_{x \rightarrow \frac{\pi}{2}} \frac{4 \cos x - 2 \sin x}{-\cot 2x}$	0
69	$\lim_{x \rightarrow 0^+} (2 \cos x - \sin x + 2 \tan x - \cot x)$	$-\infty$
70	$\lim_{x \rightarrow \frac{3}{2}\pi} \frac{4\sqrt{\cos x} + 2\sqrt{\cot x}}{5 \tan x - 1}$	0
71	$\lim_{x \rightarrow \frac{\pi}{2}^+} \frac{5 \cos x - 2 \tan x + \sin x}{\sqrt[3]{4 \sin x - 4}}$	$-\infty$
72	$\lim_{x \rightarrow -\infty} \log_5 \sin(2^x + \pi)$	$-\infty$

esercizi di riepilogo di limiti che si presentano in forma determinata



73	$\lim_{x \rightarrow +\infty} \frac{7}{1+x}$	0
74	$\lim_{x \rightarrow 0} \left( \frac{4}{x^4} + \frac{2}{x^2} \right)$	$+\infty$
75	$\lim_{x \rightarrow 3^+} \frac{3x-5}{3-x}$	$-\infty$
76	$\lim_{x \rightarrow -2^+} \frac{x}{x+2}$	$-\infty$
77	$\lim_{x \rightarrow -2^-} \frac{x}{x+2}$	$+\infty$
78	$\lim_{x \rightarrow \frac{3}{2}} \frac{x-3}{(2x-3)^2}$	$-\infty$
79	$\lim_{x \rightarrow 0^+} \left( \frac{1}{x^4} - \frac{1}{x^5} \right)$	$+\infty$
80	$\lim_{x \rightarrow 4} \frac{\log_2 x + 2}{4 \log_4 x}$	1
81	$\lim_{x \rightarrow 3^+} \frac{\ln(x-3)}{2-x}$	$+\infty$
82	$\lim_{x \rightarrow 2} \sqrt{2x + \log_2 x}$	$\sqrt{5}$
83	$\lim_{x \rightarrow 3} \cos \left( \frac{\log_3 x - 1}{x+2} \right)$	1
84	$\lim_{x \rightarrow 0^+} \left( \ln x - \frac{1}{4x^4} \right)$	$-\infty$

85	$\lim_{x \rightarrow 2} \frac{\log(x^2 + x - 5)}{2^x - 1}$	0
86	$\lim_{x \rightarrow 3} \frac{\log_3 x + 3 \log_3 \frac{3}{x}}{x - 2}$	1
87	$\lim_{x \rightarrow 1} 3 \log_3(1 - 3 \log_3 x)$	0
88	$\lim_{x \rightarrow 0^+} \frac{5x + 1}{5^x - 1}$	$+\infty$
89	$\lim_{x \rightarrow -\infty} \frac{e^{2x}}{2x}$	0
90	$\lim_{x \rightarrow 0^+} \frac{3^x \ln x}{2 + 3x}$	$-\infty$
91	$\lim_{x \rightarrow +\infty} (-x 2^x \ln x)^2$	$+\infty$
92	$\lim_{x \rightarrow +\infty} \left( \frac{\ln x}{e^{-x}} + \frac{3}{x} \right)$	$+\infty$
93	$\lim_{x \rightarrow 1^-} \left( \frac{3^x}{\ln x} + \frac{3}{x - 1} \right)$	$-\infty$
94	$\lim_{x \rightarrow +\infty} \left( \log_{\frac{1}{2}} x - 3x e^x \right)$	$-\infty$
95	$\lim_{x \rightarrow 0^+} \frac{3 \log_2 x}{-2x}$	$+\infty$
96	$\lim_{x \rightarrow \left(\frac{\pi}{2}\right)^-} e^{-\frac{5}{\cos x}}$	$0^+$

97	$\lim_{x \rightarrow +\infty} (\ln 2x)^x$	$+\infty$
98	$\lim_{x \rightarrow \pi} \frac{e^{\cos x} + 3 \sin x}{\sqrt{1 + 3 \tan x}}$	$\frac{1}{e}$
99	$\lim_{x \rightarrow 0^+} \left( \ln \frac{3}{x} \right)^{e^{\frac{3}{x}}}$	$+\infty$
100	$\lim_{x \rightarrow \left(\frac{\pi}{2}\right)^+} e^{-\frac{3}{\cos x}}$	$+\infty$
101	$\lim_{x \rightarrow 1^-} \left( \frac{3}{1-x} \right)^{x-3}$	$0^+$
102	$\lim_{x \rightarrow -\infty} (x^2 + 3)^{x^2}$	$+\infty$
103	$\lim_{x \rightarrow 0} \frac{\arctan x + 2x}{2 \cos x}$	$0$
104	$\lim_{x \rightarrow 1^-} 2 \ln \arccos x$	$-\infty$
105	$\lim_{x \rightarrow 0^+} \arctan \ln 2x$	$-\frac{\pi}{2}$
106	$\lim_{x \rightarrow 1^-} \frac{2 \arcsin x}{x-1}$	$-\infty$
107	$\lim_{x \rightarrow 1^+} \frac{\ln 3 \arctan(x-1)}{3x}$	$-\infty$
108	$\lim_{x \rightarrow 1^+} \left[ \frac{1 + 2 \cos(x-1)}{4} \right]^{\frac{2}{1-x}}$	$+\infty$

109	$\lim_{x \rightarrow -1^+} \frac{2}{\tan \ln(x+2)}$	$+\infty$
110	$\lim_{x \rightarrow 3^+} \left[ \frac{\ln(x-3)}{\sqrt[3]{3-x}} - \frac{1}{3-x} \right]$	$+\infty$
111	$\lim_{x \rightarrow 2^+} \left( \frac{x}{3x-1} \right)^{\frac{1}{\ln(x-2)}}$	1
112	$\lim_{x \rightarrow -\infty} \frac{\ln(1+e^{2x})}{\ln(1-x)}$	0
113	$\lim_{x \rightarrow 2^+} \left( \frac{1}{\sqrt{x-2}} \right)^{x-3}$	0
114	$\lim_{x \rightarrow -\infty} \frac{3^x}{(x^2-x)\ln(3-x)}$	0
115	$\lim_{x \rightarrow 3^+} \left( \frac{x-3}{e^{x-3}} \right)^{\frac{1}{x-3}}$	0
116	$\lim_{x \rightarrow +\infty} (3^x - 3)^{\arctan(3-x)}$	0
117	$\lim_{x \rightarrow 0^+} 2x^{\frac{2}{x}}$	$0^+$
118	$\lim_{x \rightarrow 0} (1 - \cos x)^{\frac{2}{x^2}}$	$0^+$
119	$\lim_{x \rightarrow 0^+} \left( \frac{2}{\sin x} \right)^{-\frac{2}{\sin x}}$	$0^+$
120	$\lim_{x \rightarrow 0^+} \left[ \log_3(\cos x) + \frac{3}{x} \right]$	$+\infty$

calcola i seguenti limiti di polinomi nella forma indeterminata  $+\infty - \infty$ 

121	$\lim_{x \rightarrow +\infty} (x^2 - 2x)$	$+\infty$
122	$\lim_{x \rightarrow -\infty} (3x^2 + 22x - 1)$	$+\infty$
123	$\lim_{x \rightarrow -\infty} (2x^3 + x^2 - 5x - 6)$	$-\infty$
124	$\lim_{x \rightarrow -\infty} (6x^7 - 5x - 8)$	$-\infty$
125	$\lim_{x \rightarrow +\infty} (x^2 - 2x^3 + 5x - x^6)$	$-\infty$
126	$\lim_{x \rightarrow -\infty} (x - 5x^2 + 1)$	$-\infty$
127	$\lim_{x \rightarrow -\infty} \left( \frac{4}{3}x - \frac{1}{4}x^2 - \frac{2}{5}x^3 - \frac{1}{4} \right)$	$+\infty$
128	$\lim_{x \rightarrow +\infty} \left( \frac{4x^4 - 5x + 2}{6} \right)$	$+\infty$
129	$\lim_{x \rightarrow -\infty} \left( -\frac{\sqrt{3}x^2 - 4x^3 + 2x - 1}{4} \right)$	$-\infty$
130	$\lim_{x \rightarrow -\infty} \left( \frac{\sqrt{2}x^2 + 2x - x^3 + 2x^2}{-24} \right)$	$-\infty$
131	$\lim_{x \rightarrow -\infty} (x^4 + 2x^5 - 3x + 8)^2$	$+\infty$
132	$\lim_{x \rightarrow +\infty} (x^4 - 2x^5 - 3x)^5$	$-\infty$

calcola i seguenti limiti di rapporto di polinomi nella forma indeterminata  $\infty/\infty$  

133	$\lim_{x \rightarrow +\infty} \frac{x^2 + 2x - 8}{2 - 5x}$	$-\infty$
134	$\lim_{x \rightarrow +\infty} \frac{6x^2 + 3x - 5}{3x^2 + 12}$	2
135	$\lim_{x \rightarrow +\infty} \frac{2x^3 - x^2 + 3}{2 - 3x^3}$	$-\frac{2}{3}$
136	$\lim_{x \rightarrow +\infty} \frac{x + 2}{2x^2 - 5}$	0
137	$\lim_{x \rightarrow +\infty} \frac{3x^2 + 2x^4 - 5}{2x^2 + 5x + 6}$	$+\infty$
138	$\lim_{x \rightarrow +\infty} \frac{x^2 - 3x^4 - 10}{-3x^2 + 4x^5 - 9}$	0
139	$\lim_{x \rightarrow +\infty} \frac{\ln 2 x^2 + 5x - 1}{2x^2 - 5}$	$\frac{\ln 2}{2}$
140	$\lim_{x \rightarrow +\infty} \frac{x^4 - 5}{-3x^4 + 5x^3 + x^2 - 2x + 1}$	$-\frac{1}{3}$
141	$\lim_{x \rightarrow -\infty} \frac{3x^4 + 5}{x^3 + 3x - 2}$	$-\infty$
142	$\lim_{x \rightarrow -\infty} \frac{-x^3 - 6x^2 - 5x + 4}{3x^2 - 8x}$	$+\infty$
143	$\lim_{x \rightarrow \infty} \frac{-5x^5 + 2}{-x^4 - 3x^5 + 7x^3 - 6x + 1}$	$\frac{5}{3}$
144	$\lim_{x \rightarrow +\infty} \frac{3x^2 + 2x^4 - 5x^5 + 2}{4x^2 - 2x^5 + 6x^3 - 6}$	$\frac{5}{2}$
145	$\lim_{x \rightarrow -\infty} \frac{x^3 + 1}{-x^2 + x + 3}$	$+\infty$

146	$\lim_{x \rightarrow \infty} \frac{2x^2 + 9}{\sqrt{2}x^2 + 3x - 6}$	$\sqrt{2}$
147	$\lim_{x \rightarrow \infty} \frac{x^3 + 2x^2 - x + 1}{-x^4 + 2x^3 - 5x + 12}$	0
148	$\lim_{x \rightarrow +\infty} \frac{5x^3 - 2x + 1}{-3x^3 + 4x^2 - x - 1}$	$-\frac{5}{3}$
149	$\lim_{x \rightarrow +\infty} \frac{4x^2 + 2x^7 - 3x + 2}{-3x^2 + 5x^8 + 6x - 4}$	0
150	$\lim_{x \rightarrow +\infty} \frac{2x^2 - x - 3}{2\sqrt{x} - 4x^3}$	0
151	$\lim_{x \rightarrow \infty} \frac{2x^4 + 3}{5x^2 - 7x^4}$	$-\frac{2}{7}$
152	$\lim_{x \rightarrow +\infty} \frac{6x^3 - x^2 + 4x - 2}{3x^2 + 25x - 1}$	$+\infty$
153	$\lim_{x \rightarrow +\infty} \frac{-x^2 + 2x - 2}{2x^3 + 5x - 3}$	0
154	$\lim_{x \rightarrow +\infty} \frac{x^2 - 4x^5 + 2x - 6}{2x^2 + x - 4x^5 + 2x^3 - 82}$	1
155	$\lim_{x \rightarrow -\infty} \frac{5x^7 + 4x^2 + 6x^6 - 2}{x^4 - x^3 + 4x^5 + 1}$	$+\infty$
156	$\lim_{x \rightarrow +\infty} \frac{2x^2 + 5x^3 - 6x^4 - 5}{-6x^3 - 4x^5 + 6x^4 - 1}$	0
157	$\lim_{x \rightarrow 5} \left( \frac{1}{x-5} - \frac{10}{x^2-25} \right)$	$\frac{1}{10}$
158	$\lim_{x \rightarrow 3} \left( \frac{1}{x-3} - \frac{6}{x^2-9} \right)$	$\frac{1}{6}$

calcola i seguenti limiti di rapporto di polinomi nella forma indeterminata 0/0



159	$\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$	2
160	$\lim_{x \rightarrow -3^-} \frac{2x + 6}{x^2 + x - 6}$	$-\frac{2}{5}$
161	$\lim_{x \rightarrow 1} \frac{1 - x}{x^2 - 4x + 3}$	$\frac{1}{2}$
162	$\lim_{x \rightarrow -2^+} \frac{x^2 - 4}{x^2 + 4x + 4}$	$-\infty$
163	$\lim_{x \rightarrow 5} \frac{-x^2 + 10x - 25}{x^2 - 7x + 10}$	0
164	$\lim_{x \rightarrow 1} \frac{x - 1}{x^3 - 4x^2 + 4x - 1}$	-1
165	$\lim_{x \rightarrow \sqrt{3}} \frac{3 - x^2}{\sqrt{3} - x}$	$2\sqrt{3}$
166	$\lim_{x \rightarrow 2^+} \frac{x^2 - 4}{x^2 - 4x + 4}$	$+\infty$
167	$\lim_{x \rightarrow \sqrt{2}} \frac{x^2 - 2}{2\sqrt{2} - x^3}$	$-\frac{\sqrt{2}}{3}$
168	$\lim_{x \rightarrow 2} \frac{x^2 - 4}{8 - x^3}$	$-\frac{1}{3}$
169	$\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 4}$	$-\frac{1}{4}$
170	$\lim_{x \rightarrow 1^+} \frac{\sqrt{x^2 + 2x - 3}}{x - 1}$	$+\infty$

171	$\lim_{x \rightarrow -2} \frac{4 - x^2}{x^4 - 16}$	$-\frac{1}{8}$
172	$\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2}$	12
173	$\lim_{x \rightarrow -\sqrt{2}} \frac{x^4 - 4}{x + \sqrt{2}}$	$-8\sqrt{2}$
174	$\lim_{x \rightarrow 1} \frac{x - 1}{\sqrt{x^2 + 2x - 3}}$	0
175	$\lim_{x \rightarrow -3} \frac{x^3 - 8x + 3}{x^2 + 8x + 15}$	$\frac{19}{2}$
176	$\lim_{x \rightarrow 3} \frac{\sqrt{x^2 - 9}}{\sqrt{x - 3}}$	$\sqrt{6}$
177	$\lim_{x \rightarrow -2} \frac{x^4 - 3x^2 + 5x + 6}{x^3 - 3x^2 - 8x + 4}$	$-\frac{15}{16}$
178	$\lim_{x \rightarrow -1} \frac{x^3 - x}{x^3 - x^2 + x + 3}$	$\frac{1}{3}$
179	$\lim_{x \rightarrow 3} \frac{3 - x}{\sqrt[3]{30 - x} - 3}$	27
180	$\lim_{x \rightarrow \frac{1}{4}} \frac{4x^3 - 13x^2 + 7x - 1}{8x^3 - 6x^2 + 9x - 2}$	$\frac{1}{6}$
181	$\lim_{x \rightarrow 2} \frac{x^3 - 2x^2 - x + 2}{x^2 - 4}$	$\frac{3}{4}$
182	$\lim_{x \rightarrow 2} \frac{x^3 - 7x + 6}{x^3 + 2x^2 - 13x + 10}$	$\frac{5}{7}$
183	$\lim_{x \rightarrow 3} \frac{x^4 - 6x^3 + 10x^2 - 6x + 9}{x^4 - 4x^3 - 2x^2 + 12x + 9}$	$\frac{5}{8}$

calcola i seguenti limiti di funzioni irrazionali di una delle forme indeterminate  $+\infty - \infty$   $\infty/\infty$   $0/0$  

184	$\lim_{x \rightarrow +\infty} (\sqrt{x^2 - 5x} - x)$	$-\frac{5}{2}$
185	$\lim_{x \rightarrow -\infty} (\sqrt{x^2 + x} + x)$	$-\frac{1}{2}$
186	$\lim_{x \rightarrow +\infty} (\sqrt{x^2 + 3} - x)$	0
187	$\lim_{x \rightarrow +\infty} (3x - \sqrt{9x^2 - 7})$	0
188	$\lim_{x \rightarrow -\infty} (x + \sqrt{x^2 + x + 3})$	$-\frac{1}{2}$
189	$\lim_{x \rightarrow +\infty} (\sqrt{x^2 + 6x + 7} - x)$	3
190	$\lim_{x \rightarrow -\infty} (\sqrt{4 + x^2} + x)$	0
191	$\lim_{x \rightarrow +\infty} (\sqrt{3x + 1} - \sqrt{x + 2})$	$+\infty$
192	$\lim_{x \rightarrow +\infty} (\sqrt{x^2 - x + 1} - \sqrt{x^2 - 4x - 2})$	$\frac{3}{2}$
193	$\lim_{x \rightarrow +\infty} (\sqrt{x^6 - 4x + 11} - x^3)$	0
194	$\lim_{x \rightarrow -\infty} (\sqrt{x^2 - 3} - \sqrt{x^2 + 5x - 6})$	$\frac{5}{2}$
195	$\lim_{x \rightarrow +\infty} (\sqrt[3]{x + 1} - \sqrt[3]{x - 3})$	0
196	$\lim_{x \rightarrow +\infty} (\sqrt{x^2 - 3x} - \sqrt{x^2 - 5x + 1})$	1

197	$\lim_{x \rightarrow +\infty} \frac{3x - 2}{\sqrt{2x + 1}}$	$+\infty$
198	$\lim_{x \rightarrow +\infty} \frac{3x - 2}{\sqrt{2x^2 + 1}}$	$\frac{3\sqrt{2}}{2}$
199	$\lim_{x \rightarrow +\infty} \frac{\sqrt{x^2 + 2}}{3x - 1}$	$\frac{1}{3}$
200	$\lim_{x \rightarrow +\infty} \frac{2x + 3}{\sqrt{x^2 + 3}}$	2
201	$\lim_{x \rightarrow -\infty} \frac{1}{x + \sqrt{x^2 + 2}}$	$+\infty$
202	$\lim_{x \rightarrow +\infty} \frac{2}{\sqrt{x^2 + 3} - x}$	$+\infty$
203	$\lim_{x \rightarrow +\infty} \frac{\sqrt{3x^2 - 1} + 2x}{-7x - 2}$	$-\frac{\sqrt{3} + 2}{7}$
204	$\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x^2 + 5}}{\sqrt[3]{5x^3 + 4x + 3}}$	$\frac{2\sqrt[3]{25}}{5}$
205	$\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x^2 + 5}}{\sqrt[3]{20x^4 + 3}}$	0
206	$\lim_{x \rightarrow +\infty} \frac{\sqrt{x} + \sqrt[3]{x}}{2 + \sqrt{x}}$	1
207	$\lim_{x \rightarrow +\infty} \frac{2x + \frac{3}{5}}{\sqrt{2x^2 + 1}}$	$\sqrt{2}$

208	$\lim_{x \rightarrow 0} \frac{\sqrt{x+9} - 3}{4x}$	$\frac{1}{24}$
209	$\lim_{x \rightarrow -3} \frac{x^2 - 9}{\sqrt{9+x}}$	0
210	$\lim_{x \rightarrow -3} \frac{\sqrt{9-x^2}}{\sqrt{1-x} - 2}$	$-\infty$
211	$\lim_{x \rightarrow 1} \frac{\sqrt{x^2 + 2x + 6} - 3x}{x^2 - 5x + 4}$	$\frac{7}{9}$
212	$\lim_{x \rightarrow 2} \frac{5 - \sqrt{8x+9}}{x^2 - 3x + 2}$	$-\frac{4}{5}$
213	$\lim_{x \rightarrow 1^+} \frac{\sqrt{x^2 - 1}}{\sqrt{x} - 1}$	$+\infty$
214	$\lim_{x \rightarrow 0} \frac{\sqrt{2x+1} - \sqrt{3x+1}}{\sqrt{x^2+16} - 2\sqrt{x+4}}$	1
215	$\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x}$	1
216	$\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x^3 - 64}$	$\frac{1}{192}$
217	$\lim_{x \rightarrow 1} \frac{\sqrt{x+1} - \sqrt{2}}{\sqrt{x+8} - 3}$	$\frac{3\sqrt{2}}{2}$
218	$\lim_{x \rightarrow 1} \frac{\sqrt{x^2 - x + 9} - \sqrt{x^2 + 3x + 5}}{x^2 + 3x - 4}$	$-\frac{2}{15}$
219	$\lim_{x \rightarrow 2} \frac{\sqrt{x^2 + 2x - 4} - \sqrt{x^2 + 3x - 6}}{x^2 - 4}$	$-\frac{1}{16}$

esercizi di riepilogo di limiti di funzioni che si possono risolvere senza far uso dei limiti notevoli 

220	$\lim_{x \rightarrow +\infty} (x^2 + 2x + 3)$	$+\infty$
221	$\lim_{x \rightarrow -9} \sqrt{ x }$	3
222	$\lim_{x \rightarrow -4} \sqrt{ x }$	2
223	$\lim_{x \rightarrow -\infty} (4x^4 - 3x^2 + 5x - 5)$	$+\infty$
224	$\lim_{x \rightarrow 0}  x - 1 $	1
225	$\lim_{x \rightarrow -\infty} \frac{\sqrt{4x^2 + 1}}{3x - 5}$	$-\frac{2}{3}$
226	$\lim_{x \rightarrow +\infty} (2x^2 - 4x^3 - x + 22)$	$-\infty$
227	$\lim_{x \rightarrow 3} \frac{2x^2 - 5x - 3}{x^3 - 3x^2 + x - 3}$	$\frac{7}{10}$
228	$\lim_{x \rightarrow 1} \frac{x^2 - 1}{x^3 - 1}$	$\frac{2}{3}$
229	$\lim_{x \rightarrow 2} (5x^2 + 2x - 20)^2$	16
230	$\lim_{x \rightarrow -\infty} e^x$	0
231	$\lim_{x \rightarrow 1} \frac{2x + 3}{3x + 4}$	$\frac{5}{7}$

232	$\lim_{x \rightarrow +\infty} \frac{x^3 - 1}{1 - 2x^2}$	$+\infty$
233	$\lim_{x \rightarrow 1} \frac{x^2 - 5x + 4}{x^2 - 3x + 2}$	3
234	$\lim_{x \rightarrow 3} \sqrt{5x + 10}$	5
235	$\lim_{x \rightarrow -\infty} \frac{x^3 + 2x^2 - 3x}{2x^2 - 3x + 1}$	$-\infty$
236	$\lim_{x \rightarrow 5} \frac{2x - 1 - \sqrt{4x^2 - 2x - 9}}{x - 5}$	$-\frac{1}{9}$
237	$\lim_{x \rightarrow -\infty} \left( \sqrt{x^2 - x - 2} - \sqrt{x^2 - 2x + 3} \right)$	$-\frac{1}{2}$
238	$\lim_{x \rightarrow \frac{1}{4}}^{1^+} \log_{\frac{1}{3}} \frac{2x + 1}{4x - 1}$	$-\infty$
239	$\lim_{x \rightarrow +\infty} \frac{2x^2 - 3x - 2}{-3x^2 + 5x + 6}$	$-\frac{2}{3}$
240	$\lim_{x \rightarrow \pi} \frac{\sin x}{x}$	0
241	$\lim_{x \rightarrow +\infty} \left( \sqrt{x + 5} - \sqrt{x - 3} \right)$	0
242	$\lim_{x \rightarrow +\infty} \frac{4x^2 + x - 14}{2x^2 + 11x - 2}$	2
243	$\lim_{x \rightarrow 2} \frac{2x^2 - 3x - 2}{\ln(2x - 3)}$	$\frac{5}{2}$

244	$\lim_{x \rightarrow +\infty} (\sqrt[3]{x-1} - \sqrt[3]{2x})$	$-\infty$
245	$\lim_{x \rightarrow -\infty} (-2x^5 - x^4 + 2x - 10)^3$	$+\infty$
246	$\lim_{x \rightarrow 1^-} e^{\frac{1}{x-1}}$	0
247	$\lim_{x \rightarrow +\infty} \frac{1}{\sqrt{x^2 - x - 2} - \sqrt{x^2 - 2x - 3}}$	2
248	$\lim_{x \rightarrow 2} \frac{\sqrt[3]{10-x} - 2}{x-2}$	$-\frac{1}{12}$
249	$\lim_{x \rightarrow 0^-} \frac{2x+3}{\sin x}$	$-\infty$
250	$\lim_{x \rightarrow -\infty} \arctan \frac{x^3+5}{x^2-2x}$	$-\frac{\pi}{2}$
251	$\lim_{x \rightarrow 0} \tan   -3x  $	0
252	$\lim_{x \rightarrow 2} \log_{\frac{1}{4}} \log_3(x-1)$	$+\infty$
253	$\lim_{x \rightarrow +\infty} \sqrt{6x-35}$	$+\infty$
254	$\lim_{x \rightarrow +\infty} e^{x+2} + 2$	$+\infty$
255	$\lim_{x \rightarrow +\infty} \arctan \frac{2x^3+1}{x^2}$	$\frac{\pi}{2}$
256	$\lim_{x \rightarrow 1} \frac{\sqrt[3]{x}-1}{x-1}$	$\frac{1}{3}$
257	$\lim_{x \rightarrow +\infty} (\sqrt{3+2x} - \sqrt{4+2x})$	0

calcola i seguenti limiti utilizzando i limiti notevoli delle funzioni goniometriche 

258	$\lim_{x \rightarrow 0} \frac{\sin 5x}{\sin 2x}$	$\frac{5}{2}$
259	$\lim_{x \rightarrow 0} \frac{2x + \sin 3x}{4x + \sin 7x}$	$\frac{5}{11}$
260	$\lim_{x \rightarrow 0} \frac{\sin(x^2 - 5x)}{\sin 3x}$	$-\frac{5}{3}$
261	$\lim_{x \rightarrow 0} \frac{1 - \cos^3 x}{5x \sin x}$	$\frac{3}{10}$
262	$\lim_{x \rightarrow 0} \frac{1 - \cos x}{4 \sin \frac{x}{2} \tan x}$	$\frac{1}{4}$
263	$\lim_{x \rightarrow 0} \frac{1 - \cos 3x}{\sin^2 2x}$	$\frac{9}{8}$
264	$\lim_{x \rightarrow 0} \frac{\tan^2 3x}{1 - \cos x}$	18
265	$\lim_{x \rightarrow 0^+} \frac{\sqrt{1 - \cos x}}{5x}$	$\frac{\sqrt{2}}{10}$
266	$\lim_{x \rightarrow 0} \frac{1 - \cos 3x}{x \sin x}$	$\frac{9}{2}$
267	$\lim_{x \rightarrow 0} \frac{\sin^2 x}{5x \tan x}$	$\frac{1}{5}$
268	$\lim_{x \rightarrow 0} \frac{2x^2}{1 - \cos^3 x}$	$\frac{4}{3}$
269	$\lim_{x \rightarrow 0} \frac{7 \sin x}{x + \tan x}$	$\frac{7}{2}$

270	$\lim_{x \rightarrow 0} \frac{\cos x - 1}{4 \tan^2 x}$	$-\frac{1}{8}$
271	$\lim_{x \rightarrow 4} \frac{\sin(4 - x)}{16 - x^2}$	$\frac{1}{8}$
272	$\lim_{x \rightarrow 0} \frac{\sin \frac{x}{2}}{x}$	$\frac{1}{2}$
273	$\lim_{x \rightarrow 0} \frac{\tan x}{3x}$	$\frac{1}{3}$
274	$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x}$	0
275	$\lim_{x \rightarrow 0} \frac{\sin 2x}{x \cos x}$	2
276	$\lim_{x \rightarrow 0} \frac{3 \sin x + 2x}{x}$	5
277	$\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 5x}$	$\frac{3}{5}$
278	$\lim_{x \rightarrow 0} \frac{\sin^2 x}{1 - \cos x}$	2
279	$\lim_{x \rightarrow 0} \frac{2 \sin x + 3x - 4x^2}{3 \sin x - x}$	$\frac{5}{2}$
280	$\lim_{x \rightarrow 0^+} \frac{\sqrt{1 - \cos x}}{x}$	$\frac{\sqrt{2}}{2}$

281	$\lim_{x \rightarrow 0} \frac{1 - \cos^3 x}{x \sin x}$	$\frac{3}{2}$
282	$\lim_{x \rightarrow 0} \frac{\arcsin 6x}{\arctan 5x}$	$\frac{6}{5}$
283	$\lim_{x \rightarrow 0} \frac{x \arctan 2x}{1 - \cos 3x}$	$\frac{4}{9}$
284	$\lim_{x \rightarrow 0} \frac{3\arcsin x + 2\arctan x}{\sin x + 5x}$	$\frac{5}{6}$
calcola i seguenti limiti effettuando un cambio di variabile		
285	$\lim_{x \rightarrow -4} \frac{\tan \pi x}{x + 4}$	$\pi$
286	$\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 - \sin x}{\cos x}$	0
287	$\lim_{x \rightarrow -\frac{\pi}{4}} \frac{\sin x + \cos x}{\cos 2x}$	$\frac{\sqrt{2}}{2}$
288	$\lim_{x \rightarrow \pi} \frac{1 + \cos^3 x}{2 \cos^2 \frac{x}{2}}$	3
289	$\lim_{x \rightarrow \pi} \frac{\sin x + \sin^3 x}{x - \pi}$	-1
290	$\lim_{x \rightarrow \frac{\pi}{2}} \frac{5 \sin^2 x + \sin x - 6}{\left(x - \frac{\pi}{2}\right)}$	0
291	$\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin x - \cos x}{\tan \left(\frac{\pi}{8} - \frac{x}{2}\right)}$	$-2\sqrt{2}$

calcola i seguenti limiti utilizzando i **limiti notevoli** delle funzioni esponenziali e logaritmiche 

292	$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^{3x}$	$e^3$
293	$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{2x}\right)^x$	$\sqrt{e}$
294	$\lim_{x \rightarrow 0} \left(1 - \frac{x}{3}\right)^{\frac{5}{x}}$	$\sqrt[3]{e^5}$
295	$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^{3x-2}$	$e^3$
296	$\lim_{x \rightarrow \infty} \left(1 - \frac{2}{x}\right)^x$	$\frac{1}{e^2}$
297	$\lim_{x \rightarrow 0} \left(1 - \frac{2x}{3}\right)^{\frac{1}{x}}$	$e^{\frac{2}{3}}$
298	$\lim_{x \rightarrow +\infty} \left(\frac{x+3}{x+2}\right)^x$	$e$
299	$\lim_{x \rightarrow 0} (1+x)^{\frac{7}{x}}$	$e^7$
300	$\lim_{x \rightarrow 0} (1+2x)^{\frac{1}{x}}$	$e^2$
301	$\lim_{x \rightarrow 0} (1+x)^{\frac{1}{3x}}$	$e^{\frac{1}{3}}$
302	$\lim_{x \rightarrow +\infty} (x+1)^{-\frac{1}{\ln x}}$	$\frac{1}{e}$
303	$\lim_{x \rightarrow 0} (1+2x)^{\frac{3}{x}}$	$e^6$

304	$\lim_{x \rightarrow 2} \frac{e^x - e^2}{x - 2}$	$e^2$
305	$\lim_{x \rightarrow 0} \frac{x}{1 - e^{3x}}$	$-\frac{1}{3}$
306	$\lim_{x \rightarrow 0} \frac{1 - e^{4x}}{7x}$	$-\frac{4}{7}$
307	$\lim_{x \rightarrow 0} \frac{e^{3x} - 1}{5x}$	$\frac{3}{5}$
308	$\lim_{x \rightarrow 0} \frac{4^x - 1}{5^x - 1}$	$\frac{\ln 4}{\ln 5}$
309	$\lim_{x \rightarrow 0} \frac{e^{3x} - 1}{2^{5x} - 1}$	$\frac{3}{5 \ln 2}$
310	$\lim_{x \rightarrow 0} \frac{e^x - e^{-x}}{e^{2x} - e^{-2x}}$	$\frac{1}{2}$
311	$\lim_{x \rightarrow 0} \frac{5^{2x} - 1}{x}$	$\ln 25$
312	$\lim_{x \rightarrow 0} \frac{2^{2x} - 1}{3^x - 1}$	$2 \frac{\ln 2}{\ln 3}$
313	$\lim_{x \rightarrow 0} \frac{(1 + 2x)^4 - 1}{x}$	8
314	$\lim_{x \rightarrow 1} \frac{x - 1}{e^x - e}$	$\frac{1}{e}$
315	$\lim_{x \rightarrow -2} \frac{e^{x+2} - 1}{x + 2}$	1

316	$\lim_{x \rightarrow 3} \frac{x - 3}{\ln x - \ln 3}$	3
317	$\lim_{x \rightarrow +\infty} \frac{5}{x} [\ln(1 + x) - \ln x]$	0
318	$\lim_{x \rightarrow 0} \frac{\ln(1 + 3x)}{x}$	3
319	$\lim_{x \rightarrow 0} \frac{\ln(1 + 2x)}{\ln(1 + x)}$	2
320	$\lim_{x \rightarrow 0} \frac{\log_3(1 + x)}{2x}$	$\frac{1}{2} \log_3 e$
321	$\lim_{x \rightarrow +\infty} \left( \frac{1}{2x} \right)^{\frac{1}{\ln 3x}}$	$\frac{1}{e}$
322	$\lim_{x \rightarrow 0} \frac{\log_2(1 + x)}{3^x - 1}$	$\frac{1}{\ln 2 \ln 3}$
323	$\lim_{x \rightarrow 0} \frac{\ln(1 + x)}{3^x - 1}$	$\frac{1}{\ln 3}$
324	$\lim_{x \rightarrow +\infty} x \left( 3^{\frac{1}{x}} - 1 \right)$	$\ln 3$
325	$\lim_{x \rightarrow 0^+} \frac{(1 + 5x^2)^{\frac{3}{x^2}}}{5x + 3}$	$\frac{e^{15}}{3}$
326	$\lim_{x \rightarrow \infty} \frac{1 - e^{\frac{1}{x}}}{\ln \left( 1 + \frac{1}{5x} \right)}$	-5
327	$\lim_{x \rightarrow 0} \frac{\ln(1 + 3x^2)}{2x^2 - 1}$	$\frac{3}{\ln 2}$
328	$\lim_{x \rightarrow 3} \frac{\ln(x - 2)}{e^x - e^3}$	$\frac{1}{e^3}$

## esercizi di riepilogo di varie tipologie



329	$\lim_{x \rightarrow +\infty} (x^2 - 4x + 1)$	$+\infty$
330	$\lim_{x \rightarrow 0} \frac{\sin 3x}{3x}$	1
331	$\lim_{x \rightarrow -\infty} \frac{2x^3 + 4x^2 - 3x + 5}{-2x^3 + 9x^2 + 3x - 1}$	-1
332	$\lim_{x \rightarrow 1} \frac{\ln x}{e^x - e}$	$e^{-1}$
333	$\lim_{x \rightarrow 0} \frac{\tan x}{x}$	1
334	$\lim_{x \rightarrow 0} \frac{5 - 5e^{3x}}{x}$	-15
335	$\lim_{x \rightarrow 0} \frac{\sin 4x}{x}$	4
336	$\lim_{x \rightarrow +\infty} \frac{5}{2} x \sin \frac{1}{x}$	$\frac{5}{2}$
337	$\lim_{x \rightarrow 0^+} \frac{\ln x}{x}$	$-\infty$
338	$\lim_{x \rightarrow +\infty} (-2x^2 - 2x + 5)$	$-\infty$

339	$\lim_{x \rightarrow 0} \frac{\sin 5x}{x}$	5
340	$\lim_{x \rightarrow +\infty} \frac{x^2 - 3x^3 + 2x - 1}{3x^2 - 4x^3 + 2x + 8}$	$\frac{3}{4}$
341	$\lim_{x \rightarrow -\infty} (x + \sin x)$	$-\infty$
342	$\lim_{x \rightarrow +\infty} (\sqrt[5]{x} + 2^{-x})$	$+\infty$
343	$\lim_{x \rightarrow \infty} x \sin \frac{1}{x}$	1
344	$\lim_{x \rightarrow 0} \frac{\sin 4x}{7x}$	$\frac{4}{7}$
345	$\lim_{x \rightarrow +\infty} \frac{2x + \cos x}{3x - \sin x}$	$\frac{2}{3}$
346	$\lim_{x \rightarrow 0} \frac{\tan 3x}{x}$	3
347	$\lim_{x \rightarrow 2} \frac{2x^3 - 9x^2 + 12x - 4}{x^3 - x^2 - 8x + 12}$	$\frac{3}{5}$
348	$\lim_{x \rightarrow 3^+} \frac{\log_2(x - 3)}{5 \arcsin(4 - x)}$	$-\infty$
349	$\lim_{x \rightarrow 0} \frac{\sin 120x}{6x}$	20

350	$\lim_{x \rightarrow 0} (3x \cot x)$	3
351	$\lim_{x \rightarrow 0} \frac{\sin 8x}{\tan 2x}$	4
352	$\lim_{x \rightarrow 0} \frac{\tan 3x}{\sin x}$	3
353	$\lim_{x \rightarrow 0} \frac{e^{\sin x} - 1}{2x}$	$\frac{1}{2}$
354	$\lim_{x \rightarrow +\infty} \frac{\ln x + 3}{3 \ln x - 1}$	$\frac{1}{3}$
355	$\lim_{x \rightarrow 0} \frac{e^{2x} - 1}{x}$	2
356	$\lim_{x \rightarrow 0} \frac{e^{3x} - 1}{\sin 5x}$	$\frac{3}{5}$
357	$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$	$\frac{1}{2}$
358	$\lim_{x \rightarrow 0} \frac{e^{3x} - 1}{\sin 5x}$	$\frac{3}{5}$
359	$\lim_{x \rightarrow 0} \frac{2x + \sin x}{x}$	3
360	$\lim_{x \rightarrow 0} \frac{x \tan x}{1 - \cos x}$	2
361	$\lim_{x \rightarrow 0} \frac{\sin 15x}{5x}$	3
362	$\lim_{x \rightarrow 0} \frac{x^2 - x}{\sin 4x}$	$-\frac{1}{4}$

363	$\lim_{x \rightarrow 0} \frac{\sin \frac{x}{5}}{\log_3(1+x)}$	$\frac{\ln 3}{5}$
364	$\lim_{x \rightarrow 3^+} \arctan \frac{4}{3-x}$	$-\frac{\pi}{2}$
365	$\lim_{x \rightarrow 0^+} \ln 3x - \ln(\sin 5x)$	$-\ln \frac{5}{3}$
366	$\lim_{x \rightarrow 0} \frac{2}{3} \frac{\sin x \cos x - \sin x}{x^2}$	0
367	$\lim_{x \rightarrow 0} \frac{1 - \cos(x^2)}{3x^2 \sin^2 x}$	$\frac{1}{6}$
368	$\lim_{x \rightarrow 0} \frac{\ln(1-2x)}{\ln(1+5x)}$	$-\frac{2}{5}$
369	$\lim_{x \rightarrow 0} \frac{\ln(2 - \cos x)}{3 \sin^2 x}$	$\frac{1}{6}$
370	$\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{2x^3}$	$\frac{1}{4}$
371	$\lim_{x \rightarrow 0} \frac{\sin x^3}{\sin^3 x}$	1
372	$\lim_{x \rightarrow 0} \frac{\sin 3\pi x}{\sin 2\pi x}$	$\frac{3}{2}$
373	$\lim_{x \rightarrow 0} \frac{x - 2 \sin x}{x + \tan x}$	$-\frac{1}{2}$
374	$\lim_{x \rightarrow 0} \frac{3 \sin x}{x + \tan x}$	$\frac{3}{2}$

375	$\lim_{x \rightarrow +\infty} 2x[\log_2(x+1) - \log_2 x]$	$2 \log_2 e$
376	$\lim_{x \rightarrow 2^+} \arccos \frac{\sqrt{x-2}}{x+1}$	$\frac{\pi}{2}$
377	$\lim_{x \rightarrow 2^-} \arctan \frac{3}{x-2}$	$-\frac{\pi}{2}$
378	$\lim_{x \rightarrow +\infty} \frac{\sqrt{x+1} - \sqrt{x}}{\sqrt{x+3} - \sqrt{x+2}}$	1
379	$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{3x}\right)^{5x}$	$e^{\sqrt[3]{e^2}}$
380	$\lim_{x \rightarrow 0} \frac{\ln(3+x) - \ln 3}{4x}$	$\frac{1}{12}$
381	$\lim_{x \rightarrow 0} \arcsin \frac{2x^2 + 3x + 1}{x-1}$	$-\frac{\pi}{2}$
382	$\lim_{x \rightarrow +\infty} \left(1 - \frac{2e}{x}\right)^x$	$e^{-2e}$
383	$\lim_{x \rightarrow 0} \frac{-3 \sin x}{\log_5(1+3x)}$	$-\ln 5$
384	$\lim_{x \rightarrow 1} \frac{\arcsin(1-x)}{\sqrt{e^x}}$	0
385	$\lim_{x \rightarrow 0} \frac{1 - \cos 6x}{5x^2}$	$\frac{18}{5}$
386	$\lim_{x \rightarrow 0} \frac{\sin^2 x}{x}$	0
387	$\lim_{x \rightarrow +\infty} \frac{2 \ln^2 x - 3 \ln x + 3}{5 \ln^2 x - 6 \ln x + 1}$	$\frac{2}{5}$

388	$\lim_{x \rightarrow +\infty} \left( \frac{2x+1}{2x-5} \right)^{3x-1}$	$e^9$
389	$\lim_{x \rightarrow 0} \frac{3 \sin^3 x + x^3}{\tan x - \sin x}$	8
390	$\lim_{x \rightarrow 0} \frac{\sin x - x}{x^3}$	$-\frac{1}{6}$
391	$\lim_{x \rightarrow 0} \frac{e^x - x - 1}{x^2}$	$\frac{1}{2}$
392	$\lim_{x \rightarrow \infty} \left( 1 + \frac{5}{x} \right)^x$	$e^5$
393	$\lim_{x \rightarrow \infty} \left( 1 + \frac{1}{x} \right)^{2x}$	$e^2$
394	$\lim_{x \rightarrow -6^+} \frac{2x^2 + 8x - 24}{72 - 2x^2}$	$-\frac{2}{3}$
395	$\lim_{x \rightarrow 0} \frac{5 \cos x - 5 \cos^2 x}{4 \sin^2 x}$	$\frac{5}{8}$
396	$\lim_{x \rightarrow 0} \frac{\tan x + \sin x}{3x}$	$\frac{2}{3}$
397	$\lim_{x \rightarrow 0} \frac{x \arcsin 7x}{1 - \cos 4x}$	$\frac{7}{8}$
398	$\lim_{x \rightarrow 0} \frac{\sqrt[5]{x+1} - 1}{5x}$	$\frac{1}{25}$
399	$\lim_{x \rightarrow 0} \frac{x^3}{\sin^2 x}$	0
400	$\lim_{x \rightarrow -5^+} \frac{x+5}{x^2 + x - 20}$	$-\frac{1}{9}$

401	$\lim_{x \rightarrow 0} \frac{x^2}{1 - \cos x}$	2
402	$\lim_{x \rightarrow \infty} \left(1 - \frac{1}{x}\right)^x$	$\frac{1}{e}$
403	$\lim_{x \rightarrow 0} \frac{3 \sin x + 4x \cos x}{2 \sin x - 3x \cos x}$	-7
404	$\lim_{x \rightarrow 0} \frac{\sin^2 x}{1 - \cos^3 x}$	$\frac{2}{3}$
405	$\lim_{x \rightarrow +\infty} \left(1 - \frac{3}{2x}\right)^x$	$e^{-\frac{3}{2}}$
406	$\lim_{x \rightarrow +\infty} \arccos \frac{5}{x+2}$	$\frac{\pi}{2}$
407	$\lim_{x \rightarrow 0^+} \frac{8}{\operatorname{arccot} x - \frac{\pi}{2}}$	$-\infty$
408	$\lim_{x \rightarrow 0} \frac{(1+x)^5 - 1}{x}$	5
409	$\lim_{x \rightarrow 0} \frac{2x + 3 \sin x}{5 \tan x}$	1
410	$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{2x}\right)^{2x}$	$e$
411	$\lim_{x \rightarrow 0} \frac{\sin 5x}{\sqrt[5]{x+1} - 1}$	25
412	$\lim_{x \rightarrow +\infty} \left(\sqrt{x^3 - 3} - \sqrt{x^3 + 5}\right)$	0

413	$\lim_{x \rightarrow \infty} \left(1 + \frac{3}{x}\right)^x$	$e^3$
414	$\lim_{x \rightarrow 0} \frac{\sqrt[3]{x+1} - 1}{e^{2x} - 1}$	$\frac{1}{6}$
415	$\lim_{x \rightarrow 0} x^{\frac{2}{\ln x}}$	$e^2$
416	$\lim_{x \rightarrow +\infty} (\sqrt{x^4 - 3x + 1} - x^2)$	0
417	$\lim_{x \rightarrow 0} \frac{\sin^2 x + 2x^2 + x^3}{4x^2 + 5\sin^2 x}$	$\frac{1}{3}$
418	$\lim_{x \rightarrow -\infty} \frac{\sqrt{8x^{14} - 3x^5 + x^3 - x^2 + 2}}{5x^4 - x^2 + x - 5}$	$+\infty$
419	$\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 - \cos^3 x}{2 \sin^2 \frac{x}{2}}$	1
420	$\lim_{x \rightarrow 1} \frac{2^{3x-3} - 1}{3x^2 + x - 4}$	$\frac{3}{7} \ln 2$
421	$\lim_{x \rightarrow 0} \frac{x \tan x}{\ln(1 + 3x^2)}$	$\frac{1}{3}$
422	$\lim_{x \rightarrow 3} \frac{2^{x-3} - 1}{x - 3}$	$\ln 2$
423	$\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 - \sin x}{2 \cos x}$	0
424	$\lim_{x \rightarrow +\infty} \frac{3x - 2}{\sqrt{4x - 1} + \sqrt{x + 1}}$	$+\infty$

425	$\lim_{x \rightarrow 0} \frac{\pi^x - 3^x}{x}$	$\ln \frac{\pi}{3}$
426	$\lim_{x \rightarrow -\infty} \left( \frac{x^3}{3x^2 - 4} - \frac{x^2}{3x + 9} \right)$	1
427	$\lim_{x \rightarrow +\infty} \frac{x + \cos x}{\sqrt{x} - 1}$	$+\infty$
428	$\lim_{x \rightarrow 3} \frac{2^{x-3} - 1}{x - 3}$	$\ln 2$
429	$\lim_{x \rightarrow +\infty} \frac{\ln(3 + \sin x)}{x^3}$	0
430	$\lim_{x \rightarrow 0} \frac{e^x - e^{-x}}{\sin x}$	2
431	$\lim_{x \rightarrow 0} \frac{\ln(1 + 5x)}{e^{2x} - 1}$	$\frac{5}{2}$
432	$\lim_{x \rightarrow 0^+} \frac{\sin 2x}{x \tan x}$	$+\infty$
433	$\lim_{x \rightarrow +\infty} \sqrt{x} (\sqrt{x+1} - \sqrt{x})$	$\frac{1}{2}$
434	$\lim_{x \rightarrow 0^+} x^x$	1
435	$\lim_{x \rightarrow 0} \frac{e^{5x} - \ln(ex + e)}{x}$	4
436	$\lim_{x \rightarrow 2} \frac{2x^3 - 5x^2 - 4x + 12}{x^4 - 4x^3 + 5x^2 - 4x + 4}$	$\frac{7}{5}$

## limiti più impegnativi

437	$\lim_{x \rightarrow 0} \frac{(e^x - 1)x \sin x}{(1 - \cos x) \ln(1 + x)}$	2
438	$\lim_{x \rightarrow 0^+} (\ln^2 x)^{\sin x}$	1
439	$\lim_{x \rightarrow +\infty} \frac{\ln x}{\ln \ln x}$	$+\infty$
440	$\lim_{x \rightarrow -\infty} (8x + x \sin^2 x)$	$-\infty$
441	$\lim_{x \rightarrow 0^+} \left(1 + e^{\frac{1}{x^3}}\right)^{\sin x}$	$+\infty$
442	$\lim_{x \rightarrow 0^+} \frac{x \ln^5 x + \sqrt[4]{x} \ln x}{\sqrt{x}}$	$-\infty$
443	$\lim_{x \rightarrow +\infty} \frac{x^2 - 5x}{x + 1} (e - 2^{\sin x})$	$+\infty$
444	$\lim_{x \rightarrow 0^+} x \ln^2 x$	0
445	$\lim_{x \rightarrow 0} \frac{\sqrt{2x^3} - x^6}{4x^6 - \sqrt{x^4 + x^3}}$	$-\sqrt{2}$
446	$\lim_{x \rightarrow +\infty} (3^{(x^2)} - (3^x)^2)$	$+\infty$
447	$\lim_{x \rightarrow 0^+} (1 + \ln^2 x)^{\sin x}$	$+\infty$
448	$\lim_{x \rightarrow \pi} \frac{\cos x + 1}{\cos 3x + 1}$	$\frac{1}{9}$

449	$\lim_{x \rightarrow \frac{\pi}{3}} \frac{\tan x - \sqrt{3}}{1 - \sqrt{3} \cot x}$	$\sqrt{3}$
450	$\lim_{x \rightarrow 0^+} (x^x + x^{-\frac{1}{x}})$	$+\infty$
451	$\lim_{x \rightarrow 1} \frac{2^{3x-3} - 1}{3x^2 + x - 4}$	$\frac{3}{7} \ln 2$
452	$\lim_{x \rightarrow 0} (1 + \sin x)^{\csc x}$	$e$
453	$\lim_{x \rightarrow \infty} \left(1 + \frac{4}{5x}\right)^{5x+1}$	$e^4$
454	$\lim_{x \rightarrow \frac{\pi}{2}} \frac{3 \operatorname{sen}^2 x + \operatorname{sen} x - 4}{\left(x - \frac{\pi}{2}\right)^2}$	$-\frac{7}{2}$
455	$\lim_{x \rightarrow +\infty} (\sqrt[3]{x+1} - \sqrt[3]{x})$	$0$
456	$\lim_{x \rightarrow 0} \frac{\ln(1+x^3)}{\sin x^2 \cdot (1+e^{2x})}$	$0$
457	$\lim_{x \rightarrow 0} \frac{\ln(1+5x) - \ln(1+x)}{\ln(1-x) - \ln(1-2x)}$	$4$
458	$\lim_{x \rightarrow \frac{\pi}{2}} \frac{(2x - \pi) \cos x}{x(1 - \sin x)}$	$-\frac{8}{\pi}$
459	$\lim_{x \rightarrow \infty} \left(\frac{x^2}{x^2 - 2}\right)^{x^2 - 2}$	$e^2$
460	$\lim_{x \rightarrow 0} \frac{e^{2x^2} - \cos x}{\ln(1+9x^2)}$	$\frac{5}{18}$

461	$\lim_{x \rightarrow 1} \frac{e^{5x} - e^5}{\sin(3 \ln x)}$	$\frac{5}{3} e^5$
462	$\lim_{x \rightarrow 0^+} x^{\frac{1}{\ln^2 x}}$	1
463	$\lim_{x \rightarrow +\infty} \left( \frac{x-3}{x+4} \right)^{\frac{x^2-1}{2x}}$	$e^{-\frac{7}{2}}$
464	$\lim_{x \rightarrow 0} \frac{\ln(1+3x)}{\sin \sin x}$	3
465	$\lim_{x \rightarrow 0} \frac{e^{\sin 2x} - e^{\sin x}}{\tan x}$	1
466	$\lim_{x \rightarrow 0} (1 + \tan^2 x)^{\frac{1}{x \ln(x+1)}}$	$e$
467	$\lim_{x \rightarrow 0} \frac{\sin x^2}{\sqrt[6]{1+x^2} - 1}$	6
468	$\lim_{x \rightarrow +\infty} \left( \frac{1}{x} \right)^{-\frac{1}{1+\ln x}}$	$e$
469	$\lim_{x \rightarrow \infty} \left( \frac{2x+1}{3+2x} \right)^{x-1}$	$\frac{1}{e}$
470	$\lim_{x \rightarrow \infty}  x ^{\frac{1}{\ln x }}$	$e$
471	$\lim_{x \rightarrow +\infty} \left( \sqrt[3]{x^3 + 6x^2 - 3x + 2} - x \right)$	2
472	$\lim_{x \rightarrow 0} \frac{\sqrt[4]{x+1} - 1}{\sqrt[6]{x+1} - 1}$	$\frac{3}{2}$

verifica i seguenti limiti del tipo  $\lim_{x \rightarrow x_0} f(x) = l$  utilizzando la definizione 

473	$\lim_{x \rightarrow 0} (4x + 2) = 2$	
474	$\lim_{x \rightarrow 2} (2x - 1) = 3$	
475	$\lim_{x \rightarrow 5} (2x - 1) = 9$	
476	$\lim_{x \rightarrow 1} (3x^2 - 2) = 1$	
477	$\lim_{x \rightarrow 2} \frac{x}{4x - 3} = \frac{2}{5}$	
478	$\lim_{x \rightarrow 2} \frac{9x}{4x + 1} = 2$	
479	$\lim_{x \rightarrow 1} \frac{2x + 4}{2x - 1} = 6$	
480	$\lim_{x \rightarrow 2} \left( \frac{x}{3} + 2 \right) = \frac{8}{3}$	
481	$\lim_{x \rightarrow 2} \frac{x^2 - 4}{x + 2} = 0$	
482	$\lim_{x \rightarrow 1^-} \sqrt{1 - x} = 0$	
483	$\lim_{x \rightarrow 0} (2 -  3x + 2 ) = 0$	
484	$\lim_{x \rightarrow 2} \log_3(2x - 1) = 1$	
485	$\lim_{x \rightarrow \frac{\pi}{6}} (4 \sin x + 1) = 3$	$-\frac{8}{\pi}$
486	$\lim_{x \rightarrow 0} (2 - \tan x) = 2$	

verifica i seguenti limiti del tipo  $\lim_{x \rightarrow \infty} f(x) = l$  utilizzando la definizione

$$487 \quad \lim_{x \rightarrow +\infty} \frac{x+4}{x+3} = 1$$

$$488 \quad \lim_{x \rightarrow \infty} \frac{3x+1}{2x-3} = \frac{3}{2}$$

$$489 \quad \lim_{x \rightarrow +\infty} \sqrt{\frac{3}{1+x}} = 0$$

$$490 \quad \lim_{x \rightarrow -\infty} (3^x + 1) = 1$$

$$491 \quad \lim_{x \rightarrow -\infty} (2 - e^{-x^2}) = 2$$

$$492 \quad \lim_{x \rightarrow +\infty} \sin \frac{1}{x} = 0$$

$$493 \quad \lim_{x \rightarrow +\infty} \sin \left( \frac{3}{1-x} \right) = 0$$

$$494 \quad \lim_{x \rightarrow +\infty} \left[ \cos \left( \frac{5}{x} \right) + 1 \right] = 2$$

$$495 \quad \lim_{x \rightarrow -\infty} 2 \tan \frac{x+1}{x^2} = 0$$

$$496 \quad \lim_{x \rightarrow -\infty} \arctan x = -\frac{\pi}{2}$$

verifica i seguenti limiti del tipo  $\lim_{x \rightarrow x_0} f(x) = \infty$  utilizzando la definizione

497	$\lim_{x \rightarrow 3^+} \frac{6}{3-x} = -\infty$
498	$\lim_{x \rightarrow 2^-} \frac{x+4}{x-2} = -\infty$
499	$\lim_{x \rightarrow 2^+} \frac{3}{x-2} = +\infty$
500	$\lim_{x \rightarrow 0} \frac{1}{x^2} = +\infty$
501	$\lim_{x \rightarrow 2^+} \frac{7}{4-2^x} = -\infty$
502	$\lim_{x \rightarrow 0^+} \frac{2}{1-e^{2x}} = -\infty$
503	$\lim_{x \rightarrow 0^+} \ln x = -\infty$
504	$\lim_{x \rightarrow -2^+} \log_5(x+2) = -\infty$
505	$\lim_{x \rightarrow 0^+} \ln(x+2x^2) = -\infty$
506	$\lim_{x \rightarrow 2^-} \frac{5}{2-x} = +\infty$
507	$\lim_{x \rightarrow 0^-} \frac{1}{x} = -\infty$
508	$\lim_{x \rightarrow 1^+} \frac{1}{x-1} = +\infty$
509	$\lim_{x \rightarrow 1^-} \frac{3x-2}{\arccos x} = +\infty$
510	$\lim_{x \rightarrow \frac{\pi}{2}^+} \tan x = -\infty$

verifica i seguenti limiti del tipo  $\lim_{x \rightarrow \infty} f(x) = \infty$  utilizzando la definizione

511	$\lim_{x \rightarrow +\infty} (2x - 1) = +\infty$
512	$\lim_{x \rightarrow -\infty} (5 - x) = +\infty$
513	$\lim_{x \rightarrow +\infty} (3x^2 - 2) = +\infty$
514	$\lim_{x \rightarrow +\infty} (2x - 3x^2) = -\infty$
515	$\lim_{x \rightarrow +\infty} (x^2 - 3x - 1) = +\infty$
516	$\lim_{x \rightarrow +\infty} \sqrt{x + 2} = +\infty$
517	$\lim_{x \rightarrow -\infty} \sqrt{2 - 4x} = +\infty$
518	$\lim_{x \rightarrow +\infty} \sqrt{3x^2 + 1} = +\infty$
519	$\lim_{x \rightarrow -\infty} \sqrt[3]{x - 11} = -\infty$
520	$\lim_{x \rightarrow -\infty} \log_1(1 - x) = -\infty$ $\frac{1}{5}$
521	$\lim_{x \rightarrow -\infty} \log_2(2x^2 + 1) = +\infty$
522	$\lim_{x \rightarrow +\infty} 2^{x+1} = +\infty$
523	$\lim_{x \rightarrow -\infty} \left(\frac{1}{2}\right)^{x-2} = +\infty$
524	$\lim_{x \rightarrow -\infty} 3^{3-x} = +\infty$