1 Calcolo di limiti

Calcolare i seguenti limiti:

1 $\lim_{n\to+\infty}\left(\frac{3n+5}{n+3}\right)^5$

2 $\lim_{x\to+\infty}\frac{\sin x+x}{x^3+3}$

3 $\lim_{x\to+\infty}\left(\frac{x^3}{x^2+1}-x\right)$

4 $\lim_{x\to+\infty}x(\sin x-2)$

5 $\lim_{x\to1}\frac{x-1}{\sqrt{x}-1}$

6 $\lim_{n\to+\infty}\frac{3n^2+5n+1}{5n^2+2n+7}$

7 $\lim_{n\to+\infty}\frac{2^n+(-1)^n}{2^n}$

8 $\lim_{x\to3}\frac{x^2-2x-3}{x^2-6x+9}$

9 $\lim_{x\to+\infty}\left(\sqrt{2+x^3}-\sqrt{1+2x^2+x^3}\right)$

10 $\lim_{x\to+\infty}\left(\sqrt[3]{2+x^3}-\sqrt[3]{1+2x^2+x^3}\right)$

11 $\lim_{x\to+\infty}\frac{\log_2(e^x+1)}{x+\operatorname{sen}x}$

12 $\lim_{x\to0}\frac{\cos x^3-1}{\sin x^5}$

13 $\lim_{t\to+\infty}\frac{\sqrt{t^6+1}\left(\cos\frac{2}{t}-1\right)}{t}$

14 $\lim_{x\to+\infty}\frac{\ln(1+2e^{x^3})}{x^3}$

15 $\lim_{x\to0}\frac{2-2\cos x}{\operatorname{sen}x^2-3\operatorname{sen}x-x^2}$

16 $\lim_{x\to0}\frac{\log_a(x+2)-\log_a 2}{x}$

17 $\lim_{x\to0}\frac{e^{\operatorname{tg}^3 x}-1}{x\left(\cos x-e^{x^2}\right)}$

18 $\lim_{t\to+\infty}\frac{t^3\log\left(1+\frac{3}{t^2}\right)}{\sqrt{t^2+1}}$

19 $\lim_{t\to+\infty}\frac{\sqrt{t^6+1}\left(\cos\frac{2}{t}-1\right)}{t}$

20 $\lim_{x\to0}\frac{\log(1+\operatorname{arctg}x)^x}{e-e^{\cos^4 x}}$

21 $\lim_{x\to0^+}\left(1+\operatorname{sen}(x^\alpha)\right)^{1/x}$ al variare di $\alpha>0$

22 $\lim_{x\to0}\frac{(\cos x)^{\tan x}-1}{x^3}$,

23 $\lim_{x\to+\infty}x^2(e^{\frac{1}{x}}-1)^{\frac{3}{2}}$

24 $\lim_{x\to+\infty}x^{\frac{1}{3}}(e^{\frac{1}{x}}-1)^{\frac{1}{2}}$

25 $\lim_{x\to0}\sin(x^{\frac{2}{5}})\frac{\log(1+x^{\frac{1}{5}})}{4x^{\frac{3}{5}}}$

26 $\lim_{x\to+\infty}\sin(\frac{1}{x^{\frac{4}{7}}})(\log(1+\frac{e}{x^{\frac{2}{7}}}))^{-2}$

27 $\lim_{x\to+\infty}\sqrt{x}\sqrt{(1+\frac{1}{x})^{\frac{1}{4}}-1}$

28 $\lim_{x\to0}\frac{(1+x^{\frac{3}{2}})^{\frac{2}{3}}-1}{e^{x^{\frac{3}{2}}}-1}$

29 $\lim_{x\to0}\frac{|4^x-1-(\log 2)\sin x|}{x^3-|x|^2}$

30 Determinare c in $\mathbb{R}$ tale che $\lim_{x\to+\infty}\left(\frac{x+c}{x-c}\right)^x=4$.

31 $\lim_{n\to+\infty}\operatorname{tg}\frac{n\sqrt{n}+1}{2n\sqrt{n}-\sqrt{n}}$

32 $\lim_{n\to+\infty}\frac{n\sin n+5}{n^2+\sqrt{n}}$

33 $\lim_{n\to+\infty}(2^n-n)$

34 $\lim_{n\to+\infty}\frac{2^n+4^n}{3^{n+1}+5^n}$

35 $\lim_{n\to+\infty}\frac{n2^n}{3^n}$

36 $\lim_{n\to+\infty}\frac{n^2}{n^2+(\log n)^{1000}-n\operatorname{sen}(n^{500})}$

37 $\lim_{n\to+\infty}\frac{n\log n}{2^n}$

38 $\lim_{n\to+\infty}e^n\operatorname{sen}\frac{1}{n^{100}}$

39 $\lim_{n\to+\infty}\frac{n\left(1-\cos\frac{1}{n}\right)}{\operatorname{sen}\frac{1}{n}}$

40 $\lim_{n\to+\infty}\frac{n+1}{\sqrt{n}+2}\operatorname{tg}\frac{1}{\sqrt{n}}$

41 $\lim_{n\to+\infty}\operatorname{tg}\frac{\pi n^2}{4n^2-5n}$

42 $\lim_{n\to+\infty}\operatorname{tg}\frac{\pi n^2}{2n^2-5n}$

43 $\lim_{n\to+\infty}(3n+2)\operatorname{sen}\dfrac{\pi n-5}{n+7}$

44 $\lim_{n\to+\infty}(2n+5)\cos\dfrac{\pi n^2+7}{2n^2+n}$

45 $\lim_{n\to+\infty}\dfrac{n^4}{n+1}\operatorname{sen}\dfrac{\log n}{n^4}$

46 $\lim_{n\to+\infty}\dfrac{(n+1)^{n+1}}{(n+2)^n}\operatorname{sen}\dfrac{1}{n}$

47 $\lim_{n\to+\infty}\left(1-\dfrac{1}{n^2}\right)^n$

48 $\lim_{n\to+\infty}\left(1-\dfrac{1}{n}\right)^{n^2}$

49 $\lim_{n\to+\infty}\left(1+\sin^2\dfrac{1}{n}\right)^n$

50 $\lim_{n\to+\infty}\cos^n\dfrac{1}{n}$

51 $\lim_{n\to+\infty}\cos^{n^2}\dfrac{1}{n}$

52 $\lim_{n\to+\infty}\left(1+\sin\dfrac{1}{n}\right)^n$

53 $\lim_{n\to+\infty}\left(n^{\sqrt{n}}-2^n\right)$

54 $\lim_{n\to+\infty}\sqrt{n}\left(\operatorname{sen}\dfrac{2}{\sqrt{n}}-\dfrac{1}{\sqrt{4n+3}}\right)$

55 $\lim_{n\to+\infty}n\left(1-\cos\dfrac{1}{\sqrt{n}}+e^{-n}\right)$

56 $\lim_{n\to+\infty}\left(\dfrac{\log(2n)+1}{\log(2n)-5}\right)^{e^n}$

57 $\lim_{n\to+\infty}\left(\dfrac{4-3\log n}{2-3\log n}\right)^{e^{n+2}}$

58 $\lim_{n\to+\infty}\left(\dfrac{1}{3}\log\left(n^2+1\right)-\log\sqrt[3]{n^2+2}\right)\operatorname{sen}n$

59 $\lim_{n\to+\infty}\dfrac{n+1}{\sqrt{n}(n+2)}(\operatorname{sen}n-\cos n)$

60 $\lim_{n\to+\infty}\left(\cos\dfrac{1}{n^2}\right)^{\sqrt{4n^8+7n+3}}$

61 $\lim_{n\to+\infty}\dfrac{n}{\log n}\left(n^{1/n}-1\right)$

62 $\lim_{n\to+\infty}\dfrac{1}{n}\left(\sqrt{n^2+2}-\sqrt{2n^2+5}\right)$

63 $\lim_{n\to+\infty}(\sqrt[4]{n+1}-\sqrt[4]{n+5})$

64 $\lim_{n\to+\infty}\dfrac{n^{\frac{5}{2}}+n^2(\log n)^3-n(\log n)^5}{\log\log 2n+n^{\frac{1}{2}}(n^4+\log n)^{\frac{1}{2}}}$

65 $\lim_{n\to+\infty}\dfrac{n^{(\log n)^3}+e^{(\log n)^2}}{1+(\log n)^n}$

66 $\lim_{n\to+\infty}\dfrac{(1+e^{\frac{2}{3}n})^{\frac{3}{2}}+3^n}{(1+2^n)^3+e^n}$

67 $\lim_{n\to+\infty}\left(\dfrac{n-5}{n+1}\right)^n$

68 $\lim_{n\to+\infty}\dfrac{n}{\log(n^6+\sqrt{n})}$

69 $\lim_{n\to+\infty}\dfrac{n}{\log(1+e^n)}$

70 $\lim_{n\to+\infty}\left(\sqrt{n^2+5n}-n\right)$

71 $\lim_{n\to+\infty}\dfrac{\sqrt{2n+(-1)^n}}{\sqrt{2n-(-1)^n}}$

72 $\lim_{n\to+\infty}n^2\operatorname{sen}\dfrac{2\pi}{(n+5)^2}$

73 $\lim_{n\to+\infty}\sqrt[n]{e^n+\log n}$

74 $\lim_{n\to+\infty}\left(n^{\sqrt{n}}-(\sqrt{n})^n\right)$

75 $\lim_{n\to+\infty}\dfrac{3n^2+(\cos n)n\log n}{(3+n)\sqrt{n^2+1}}$

76 $\lim_{n\to+\infty}\left(2-\dfrac{3}{n}\right)^{\log n}$

77 $\lim_{n\to+\infty}\dfrac{\sqrt{n^4+3n^3}-\sqrt{n^4-2n^3}}{n}$

78 $\lim_{x\to+\infty}x^{10}\ln(1+2e^{-x^3})$

79 $\lim_{n\to+\infty}\dfrac{\sqrt[n]{p}-1}{n-1},\quad p>0,$

80 $\lim_{x\to+\infty}[x\sqrt{1+x^2}-\sqrt{x^2-1}],$

81 $\lim_{x\to\infty}\left(1+\dfrac{1}{x}\right)^{\frac{1+x}{x}},$

82 $\lim_{x\to0}\dfrac{\tan x-\sin x}{x^2},$

83 $\lim_{x\to0}\left(\dfrac{x^2-2x+3}{x^2-3x+2}\right)^{\frac{\sin x}{x}},$

84 $\lim_{x\to\infty}(\sqrt{x^2+8x+3}-\sqrt{x^2+4x+3}),$

85 $\lim_{x\to1}\dfrac{x^3-6x^2+11x-6}{x^2-3x+2},$

86 $\lim_{x\to-\infty}x^{-10}3^{-(x+1)}2^x,$

87 $\lim_{x\to0}\dfrac{\sin 2x}{\log(x+1)}.$

2 Risposte ad alcuni esercizi

1: 243;

2: 0;

3: 0;

4: $-\infty$;

5: 2;

6: $\frac{3}{5}$;

7: 1;

8: non esiste, il limite per $x \to 3^+$ vale $+\infty$, mentre il limite per $x \to 3^-$ vale $-\infty$;

9: $-\infty$;

10: $-\frac{2}{3}$;

11: $\frac{1}{\ln 2}$;

12: 0;

13: -2;

14: 1;

15: 0;

16: $\frac{1}{2\ln a}$;

17: $-\frac{2}{3}$;

18: 3;

19: -2;

20: $\frac{1}{2e}$;

21: 1 se $\alpha > 1$, e se $\alpha = 1$, $+\infty$ se $0 < \alpha < 1$;

22: $-\frac{1}{2}$;

23: $+\infty$;

24: 0;

25: $\frac{1}{4}$;

26: $\frac{1}{e^2}$;

27: $\frac{1}{2}$;

28: $\frac{2}{3}$;

29: $-\infty$;

30: $c = \ln 2$;

31: $\operatorname{tg} \frac{1}{2}$;

32: 0;

33: $+\infty$;

34: 0;

35: 0;

36: 1;

37: 0;

38: $+\infty$;

39: $\frac{1}{2}$;

40: 1;

41: 1;

42: $-\infty$;

43: $3(7\pi + 5)$;

44: $\frac{\pi}{2}$;

45: 0;

46: $\frac{1}{e}$;

47: 1;

48: 0;

49: 1;

50: 1;

51: $e^{-1/2}$;

52: e;

53: $-\infty$;

54: $\frac{3}{2}$;

55: $\frac{1}{2}$;

56: $+\infty$;

57: 0;

58: 0;

59: 0;

60: e^{-1};

62: $1-\sqrt{2}$;

63: 0;

64: 1;

65: 0;

66: 0;

67: e^{-6};

68: $+\infty$;

69: 1;

70: $\frac{5}{2}$;

71: 1;

72: 2π;

73: e;

74: $-\infty$;

75: 3;

76: $+\infty$;

77: $\frac{5}{2}$;

78: 0;

86: $+\infty$.