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 $\lim_{n\to+\infty}\frac{1+2+...+n}{n^2}$

8 $\lim_{n\to+\infty}\frac{1+2^2+....+n^2}{n^3}$

9 $\lim_{n\to+\infty}\frac{2^n+(-1)^n}{2^n}$

10 $\lim_{x\to3}\frac{x^2-2x-3}{x^2-6x+9}$

11 $\lim_{x\to+\infty}\left(\sqrt{2+x^3}-\sqrt{1+2x^2+x^3}\right)$

12 $\lim_{x\to+\infty}\left(\sqrt[3]{2+x^3}-\sqrt[3]{1+2x^2+x^3}\right)$

13 $\lim_{x\to+\infty}\frac{\log_2(e^x+1)}{x+\operatorname{sen}x}$

14 $\lim_{x\to0}\frac{\cos x^3-1}{\sin x^5}$

15 $\lim_{t\to+\infty}\frac{\sqrt{t^6+1}\left(\cos\frac{2}{t}-1\right)}{t}$

16 $\lim_{x\to+\infty}\frac{\ln(1+2e^{x^3})}{x^3}$

17 $\lim_{x\to0}\frac{2-2\cos x}{\operatorname{sen}x^2-3\operatorname{sen}x-x^2}$

18 $\lim_{x\to0}\frac{\log_a(x+2)-\log_a 2}{x}$

19 $\lim_{x\to0}\frac{e^{\operatorname{tg}^3 x}-1}{x\left(\cos x-e^{x^2}\right)}$

20 $\lim_{t\to+\infty}\frac{t^3\log\left(1+\frac{3}{t^2}\right)}{\sqrt{t^2+1}}$

21 $\lim_{t\to+\infty}\frac{\sqrt{t^6+1}\left(\cos\frac{2}{t}-1\right)}{t}$

22 $\lim_{x\to0}\frac{\log(1+\operatorname{arctg}x)^x}{e-e^{\cos^4 x}}$

23 $\lim_{x\to0^+}\left(1+\operatorname{sen}(x^\alpha)\right)^{1/x}$ al variare di $\alpha>0$

24 $\lim_{x\to0}\frac{(\cos x)^{\tan x}-1}{x^3}$,

25 $\lim_{x\to+\infty}x^2(e^{\frac{1}{x}}-1)^{\frac{3}{2}}$

26 $\lim_{x\to+\infty}x^{\frac{1}{3}}(e^{\frac{1}{x}}-1)^{\frac{1}{2}}$

27 $\lim_{x\to0}\sin\left(x^{\frac{2}{5}}\right)\frac{\log\left(1+x^{\frac{1}{5}}\right)}{4x^{\frac{3}{5}}}$

28 $\lim_{x\to+\infty}\sin\left(\frac{1}{x^{\frac{4}{7}}}\right)\left(\log\left(1+\frac{e}{x^{\frac{2}{7}}}\right)\right)^{-2}$

29 $\lim_{x\to+\infty}\sqrt{x}\sqrt{(1+\frac{1}{x})^{\frac{1}{4}}-1}$

30 $\lim_{x\to0}\frac{(1+x^{\frac{3}{2}})^{\frac{2}{3}}-1}{e^{x^{\frac{3}{2}}}-1}$

31 $\lim_{x\to0}\frac{|4^x-1-(\log 2)\sin x|}{x^3-|x|^2}$

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

33 $\lim_{n\to+\infty}\operatorname{tg}\frac{n\sqrt{n}+1}{2n\sqrt{n}-\sqrt{n}}$

34 $\lim_{n\to+\infty}\frac{n\sin n+5}{n^2+\sqrt{n}}$

35 $\lim_{n\to+\infty}(2^n-n)$

36 $\lim_{n\to+\infty}\frac{2^n+4^n}{3^{n+1}+5^n}$

37 $\lim_{n\to+\infty}\frac{n2^n}{3^n}$

38 $\lim_{n\to+\infty}\frac{n^2}{n^2+(\log n)^{1000}-n\operatorname{sen}(n^{500})}$

39 $\lim_{n\to+\infty}\frac{n\log n}{2^n}$

40 $\lim_{n\to+\infty}e^n\operatorname{sen}\frac{1}{n^{100}}$

41 $\lim_{n\to+\infty}\frac{n\left(1-\cos\frac{1}{n}\right)}{\operatorname{sen}\frac{1}{n}}$

42 $\lim_{n\to+\infty}\frac{n+1}{\sqrt{n}+2}\operatorname{tg}\frac{1}{\sqrt{n}}$

43 $\lim_{n\to+\infty} \operatorname{tg} \dfrac{\pi n^2}{4n^2-5n}$

44 $\lim_{n\to+\infty} \operatorname{tg} \dfrac{\pi n^2}{2n^2-5n}$

45 $\lim_{n\to+\infty} (3n+2)\operatorname{sen} \dfrac{\pi n-5}{n+7}$

46 $\lim_{n\to+\infty} (2n+5)\cos \dfrac{\pi n^2+7}{2n^2+n}$

47 $\lim_{n\to+\infty} \dfrac{n^4}{n+1} \operatorname{sen} \dfrac{\log n}{n^4}$

48 $\lim_{n\to+\infty} \dfrac{(n+1)^{n+1}}{(n+2)^n} \operatorname{sen} \dfrac{1}{n}$

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

50 $\lim_{n\to+\infty} \left(1-\dfrac{1}{n}\right)^{n^2}$

51 $\lim_{n\to+\infty} \left(1+\sin^2 \dfrac{1}{n}\right)^n$

52 $\lim_{n\to+\infty} \cos^n \dfrac{1}{n}$

53 $\lim_{n\to+\infty} \cos^{n^2} \dfrac{1}{n}$

54 $\lim_{n\to+\infty} \left(1+\sin \dfrac{1}{n}\right)^n$

55 $\lim_{n\to+\infty} \left(n^{\sqrt{n}}-2^n\right)$

56 $\lim_{n\to+\infty} \sqrt{n}\left(\operatorname{sen} \dfrac{2}{\sqrt{n}} - \dfrac{1}{\sqrt{4n+3}}\right)$

57 $\lim_{n\to+\infty} n\left(1-\cos \dfrac{1}{\sqrt{n}} + e^{-n}\right)$

58 $\lim_{n\to+\infty} \left(\dfrac{\log(2n)+1}{\log(2n)-5}\right)^{e^n}$

59 $\lim_{n\to+\infty} \left(\dfrac{4-3\log n}{2-3\log n}\right)^{e^{n+2}}$

60 $\lim_{n\to+\infty} \left(\dfrac{1}{3}\log\left(n^2+1\right) - \log \sqrt[3]{n^2+2}\right) \operatorname{sen} n$

61 $\lim_{n\to+\infty} \dfrac{n+1}{\sqrt{n}(n+2)}(\operatorname{sen} n - \cos n)$

62 $\lim_{n\to+\infty} \left(\cos \dfrac{1}{n^2}\right)^{\sqrt{4n^8+7n+3}}$

63 $\lim_{n\to+\infty} \dfrac{n}{\log n}\left(n^{1/n}-1\right)$

64 $\lim_{n\to+\infty} \dfrac{1}{n}(\sqrt{n^2+2} - \sqrt{2n^2+5})$

65 $\lim_{n\to+\infty} (\sqrt[4]{n+1} - \sqrt[4]{n+5})$

66 $\lim_{n\to+\infty} \dfrac{n^{\frac{5}{2}} + n^2(\log n)^3 - n(\log n)^5}{\log\log 2n + n^{\frac{1}{2}}(n^4+\log n)^{\frac{1}{2}}}$

67 $\lim_{n\to+\infty} \dfrac{n^{(\log n)^3} + e^{(\log n)^2}}{1+(\log n)^n}$

68 $\lim_{n\to+\infty} \dfrac{(1+e^{\frac{2}{3}n})^{\frac{3}{2}} + 3^n}{(1+2^n)^3 + e^n}$

69 $\lim_{n\to+\infty} \left(\dfrac{n-5}{n+1}\right)^n$

70 $\lim_{n\to+\infty} \dfrac{n}{\log(n^6+\sqrt{n})}$

71 $\lim_{n\to+\infty} \dfrac{n}{\log(1+e^n)}$

72 $\lim_{n\to+\infty} \left(\sqrt{n^2+5n} - n\right)$

73 $\lim_{n\to+\infty} \dfrac{\sqrt{2n+(-1)^n}}{\sqrt{2n-(-1)^n}}$

74 $\lim_{n\to+\infty} n^2 \operatorname{sen} \dfrac{2\pi}{(n+5)^2}$

75 $\lim_{n\to+\infty} \sqrt[n]{e^n+\log n}$

76 $\lim_{n\to+\infty} \left(n^{\sqrt{n}} - (\sqrt{n})^n\right)$

77 $\lim_{n\to+\infty} \dfrac{3n^2+(\cos n)n\log n}{(3+n)\sqrt{n^2+1}}$

78 $\lim_{n\to+\infty} \left(2-\dfrac{3}{n}\right)^{\log n}$

79 $\lim_{n\to+\infty} \dfrac{\sqrt{n^4+3n^3} - \sqrt{n^4-2n^3}}{n}$

80 $\lim_{x\to+\infty} x^{10}\ln(1+2e^{-x^3})$

81 $\lim_{n\to+\infty} \dfrac{\sqrt[n]{p}-1}{n-1}, \quad p>0,$

82 $\lim_{x\to+\infty} [x\sqrt{1+x^2} - \sqrt{x^2-1}],$

83 $\lim_{x\to\infty} \left(1+\dfrac{1}{x}\right)^{\frac{1+x}{x}},$

84 $\lim_{x\to 0} \dfrac{\tan x - \sin x}{x^2},$

85 $\lim_{x\to 0}\left(\dfrac{x^2-2x+3}{x^2-3x+2}\right)^{\frac{\sin x}{x}}$,

86 $\lim_{x\to\infty}(\sqrt{x^2+8x+3}-\sqrt{x^2+4x+3})$,

87 $\lim_{x\to 1}\dfrac{x^3-6x^2+11x-6}{x^2-3x+2}$,

88 $\lim_{x\to-\infty} x^{-10}3^{-(x+1)}2^x$,

89 $\lim_{x\to 0}\dfrac{\sin 2x}{\log(x+1)}$.

2 Risposte ad alcuni esercizi

1: 243;

2: 0;

3: 0;

4: $-\infty$;

5: 2;

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

7: $\dfrac{1}{2}$;

8: $\dfrac{1}{3}$;

9: 1;

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

11: $-\infty$;

12: $-\dfrac{2}{3}$;

13: $\dfrac{1}{\ln 2}$;

14: 0;

15: -2;

16: 1;

17: 0;

18: $\dfrac{1}{2\ln a}$;

19: $-\dfrac{2}{3}$;

20: 3;

21: -2;

22: $\dfrac{1}{2e}$;

23: 1 se $\alpha>1$, e se $\alpha=1$, $+\infty$ se $0<\alpha<1$;

24: $-\dfrac{1}{2}$;

25: $+\infty$;

26: 0;

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

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

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

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

31: $-\infty$;

32: $c=\ln 2$;

33: $\operatorname{tg}\dfrac{1}{2}$;

34: 0;

35: $+\infty$;

36: 0;

37: 0;

38: 1;

39: 0;

40: $+\infty$;

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

42: 1;

43: 1;

44: $-\infty$;

45: $3(7\pi+5)$;

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

47: 0;

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

49: 1;

50: 0;

51: 1;

52: 1;

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

54: e;

55: $-\infty$;

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

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

58: $+\infty$;

59: 0;

60: 0;

61: 0;

62: e^{-1};

64: $1-\sqrt{2}$;

65: 0;

66: 1;

67: 0;

68: 0;

69: e^{-6};

70: $+\infty$;

71: 1;

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

73: 1;

74: 2π;

75: e;

76: $-\infty$;

77: 3;

78: $+\infty$;

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

80: 0;

88: $+\infty$.