1. $\lim_{x\to+\infty} \dfrac{x^3-4x+1}{2-x}$

2. $\lim_{x\to-\infty} \dfrac{1+2x+x^2}{1-3x+4x^3}$

3. $\lim_{x\to+\infty} \sqrt{\dfrac{4x+1}{x+2}}$

4. $\lim_{x\to1^+} \dfrac{1}{x-1}$

5. $\lim_{x\to3^-} \dfrac{x^2}{x-3}$

6. $\lim_{x\to1^+} \dfrac{x^2+2}{3-3x}$

7. $\lim_{x\to-\infty} \dfrac{\sin x+x}{3x-\sin x}$

8. $\lim_{x\to2} \dfrac{x-2}{\sqrt{x}-\sqrt{2}}$

9. $\lim_{x\to1} \dfrac{\sqrt{x}-1}{(x-1)^2}$

10. $\lim_{x\to-\infty} \dfrac{\sqrt{4x^2+5}}{3x-1}$

11. $\lim_{x\to+\infty} \sqrt{x^2-2}-\sqrt{x^2+x+1}$

12. $\lim_{x\to+\infty} \dfrac{2\log x+1}{1-\log x}$

13. $\lim_{x\to+\infty} \dfrac{e^x+1}{5^{-x}}$

14. $\lim_{x\to+\infty} \dfrac{e^{-x}}{\log x}$

15. $\lim_{x\to-\infty} \dfrac{2+\sin x}{3-\cos x}$

16. $\lim_{x\to-\infty} \dfrac{e^x-1}{x}$

17. $\lim_{x\to+\infty} \arcsin \dfrac{e^x}{e^x-1}$

18. $\lim_{x\to-\infty} \dfrac{\sqrt{x^2-3x+7}-\sqrt{x^2-x+6}}{5x-2}$

19. $\lim_{x\to1} \dfrac{x^3-1}{4x^2-4}$

20. $\lim_{x\to3} \dfrac{2x^2-3x-9}{3x^2-10x+3}$

21. $\lim_{x\to a} \dfrac{(x-a)^2}{x^2-a^2}$

22. $\lim_{x\to-a} \dfrac{\sqrt{2x^2-a^2}+x}{x+a} \quad (a>0)$

23. $\lim_{x\to+\infty} \dfrac{x^2}{(x+1)^2}\sqrt{\dfrac{x-1}{x+1}}$

24. $\lim_{x\to+\infty} \dfrac{\log(x+1)}{\log(x+3)}$

25. $\lim_{x\to+\infty} \dfrac{\log x+\log\left(1+\dfrac{1}{x}\right)}{\log x+\log\left(1+\dfrac{3}{x}\right)}$

26. $\lim_{x\to+\infty} \log(1+e^x)-x$

27. $\lim_{x\to\frac{\pi}{4}} e^{\frac{1}{\tan x-1}}$

28. $\lim_{x\to+\infty} \dfrac{e^x+3}{e^{2x}-1}$

29. $\lim_{x\to1^+} \log(x-1)+\dfrac{x-5}{x^2-1}$

30. $\lim_{x\to+\infty} 2^x-3^x$

31. $\lim_{x\to0} \left(\dfrac{1}{2}\right)^{\frac{1}{x}}$

32. $\lim_{x\to+\infty} 3\log\arctan\dfrac{x^2+1}{x+2}$

33. $\lim_{x\to+\infty} \dfrac{\sqrt{x+\sqrt{x+\sqrt{x}}}}{\sqrt{x+1}}$

34. $\lim_{x\to+\infty} \dfrac{\sqrt[3]{x^2}}{x^2+3\sqrt[6]{x}}$

35. $\lim_{x\to+\infty} \cos x+\sqrt{\dfrac{x^2-4}{x+9}}$

36. $\lim_{x\to+\infty} \dfrac{e^{-(1+\cos^2 x)}}{2^{x^2+x-1}}$

37. $\lim_{x\to0} x\sin\dfrac{1}{x}$

38. $\lim_{x\to+\infty} 3^{\dfrac{\cos x}{x}}$

39. $\lim_{x\to+\infty} \dfrac{x+\arctan x}{5x+\sin x}$

40. $\lim_{x\to 0}(1+x)^{\frac{1}{\sin x}}$

41. $\lim_{x\to 0}\dfrac{\log_2(1+3x)}{3x}$

42. $\lim_{x\to 0}\dfrac{7^{2x}-1}{x}$

43. $\lim_{x\to -2}\dfrac{e^{x+2}-1}{x+2}$

44. $\lim_{x\to 0}\dfrac{(1+x)^5-1}{x}$

45. $\lim_{x\to 0}\dfrac{\sqrt{1+x}-1}{5x}$

46. $\lim_{x\to 0}\dfrac{\sin x\log(1+x)}{e^{2x}-1}$

47. $\lim_{x\to 0}\dfrac{1-\cos x^3}{x^2(\sqrt{1+x}-1)}$

48. $\lim_{x\to 1}\dfrac{2x^2+x-3}{e^{2x-2}-1}$

49. $\lim_{x\to 1}\dfrac{\tan \pi x}{x-1}$

50. $\lim_{x\to 0^+}\dfrac{2^{\sqrt{x}}-1}{\sqrt[4]{1-\cos x}}$

51. $\lim_{x\to 0}\dfrac{e^{\sqrt{1-\cos x}}-1}{\sin|x|}$

52. $\lim_{x\to +\infty}\log(e^{x^2}+1)^{\frac{1}{x^2}}$

53. $\lim_{x\to \frac{1}{2}}\sqrt[4]{\left|x-\dfrac{1}{2}\right|}\log\left(x-\dfrac{1}{2}\right)^2$

54. $\lim_{x\to 0^+}\dfrac{x^{\frac{5}{2}}\log\sqrt{x}}{\sin 3x^2}$

55. $\lim_{x\to 2}\dfrac{\sin\log(x-1)}{5^x-25}$

56. $\lim_{x\to 0}\dfrac{(\sin 5x^2+1)^{\frac{1}{x^2}}}{(\sin x+\cos x)^x}$

57. $\lim_{x\to 0^+}\dfrac{\arcsin 5x^2}{\log\cos x}(e^{\sqrt{x}}-1)$

58. $\lim_{x\to +\infty}\left(\dfrac{2x^4-7}{2x^4+x^2+3}\right)^{\frac{x^2}{x+3}}$

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

60. $\lim_{x\to 0^+}\dfrac{e^{-\frac{1}{\sin x}}}{x}$

61. $\lim_{x\to +\infty}\left(\dfrac{2x-3}{x+5}\right)^{-x}$

62. $\lim_{x\to +\infty}e^{\sin^2 x}x^2\log x$

63. $\lim_{x\to \frac{\pi}{2}}(1+\sin x)^{\tan x}$

64. $\lim_{x\to +\infty}\left(\dfrac{1}{\log(x+3)}\right)^{x+2}$

65. $\lim_{x\to 0^+}(\sin x)^{\frac{1}{\log x}}$

66. $\lim_{x\to 0}(\cos^2 x)^{\cot^2 x}$

67. $\lim_{x\to 1^-}2^{\frac{1}{x-1}}\cos\dfrac{1}{x-1}$

68. $\lim_{x\to +\infty}\dfrac{2x^2+3x}{x^3+1}\sin\dfrac{x^2+1}{x}$

69. $\lim_{x\to 0}\arctan|x|\cos(1+\log|x|)$

70. $\lim_{x\to +\infty}(\sin e^x+3)^{\frac{1}{x}}$

71. $\lim_{x\to +\infty}(\log(2x+2)-\log(2x+5))\sin x$

72. $\lim_{x\to -\infty}\dfrac{e^{-\frac{x}{2}}}{e^{-x}}\arctan(2+\sin x)$

73. $\lim_{x\to +\infty}\dfrac{\sqrt{4x^2+3x}-2x}{\log\left(1+\dfrac{1}{\sqrt{x}}\right)}\log\left(2+\dfrac{1}{\sqrt{x}}\right)$

74. $\lim_{x\to 2}\dfrac{\sin(2x-4)\sin(2x+4)}{\sin\arctan(x-2)}$

75. $\lim_{x\to 1}\dfrac{\log(2x-1)}{(2^x-2)(2^{\frac{1}{x}}-2)}$

76. $\lim_{x\to +\infty}\dfrac{\log(e^{2x}+e^x+1)-\log(e^{2x}+1)}{(e^{-x}-1)\log(e^{-x}+2)}$

Studio di funzione

1. $f(x) = \arccos \dfrac{6x^2}{9+x^4}$
2. $f(x) = \arctan \sqrt[3]{1-x^2}$
3. $f(x) = \arctan \dfrac{1}{2+\log x}$
4. $f(x) = \arcsin(1-\sqrt{1-x})$
5. $f(x) = \sqrt{\operatorname{arccot}\sqrt{x+1}}$
6. $f(x) = x + \sqrt{x^2+2x}$
7. $f(x) = x + \log(1+x^2)$
8. $f(x) = x(\log x + 1)^2$
9. $f(x) = \log\left(\dfrac{x+1}{x-1}\right) - \dfrac{3}{x+1}$
10. $f(x) = \dfrac{x\log x}{\log x - 1}$
11. $f(x) = \sqrt{\dfrac{x^3-1}{x}}$
12. $f(x) = \dfrac{x}{\sqrt{1-x^2}}$
13. $f(x) = \dfrac{x^2+2}{e^x}$
14. $f(x) = e^{-\frac{1}{x^2-1}}$
15. $f(x) = x2^{\frac{x+2}{x-1}}$
16. $f(x) = \dfrac{1}{e^{2x} - 5e^x + 6}$

Stabilire il carattere delle seguenti serie numeriche

1. $\displaystyle\sum_{n\geq 0} \frac{n+2\sqrt{n}}{n^3+\sqrt{n}+2}$
2. $\displaystyle\sum_{n\geq 0} \arcsin \frac{\sqrt[n]{n}}{(n+1)^2}$
3. $\displaystyle\sum_{n\geq 1} \left(\log n - \log(n+1)\right)^2 n^2$
4. $\displaystyle\sum_{n\geq 1} (-1)^n n \sin \frac{e^{-n}}{n}$
5. $\displaystyle\sum_{n\geq 0} \frac{n 2^{\sin n}}{n+1} \sin \frac{2}{n^2}$
6. $\displaystyle\sum_{n\geq 0} n \left(1-\cos^3 \frac{1}{n}\right) \sin \frac{1}{n} \cos \frac{1}{n}$
7. $\displaystyle\sum_{n\geq 1} \left(\sqrt{n^2+1}-\sqrt{n^2-1}\right)$
8. $\displaystyle\sum_{n\geq 2} \frac{\sqrt{n}-\sqrt{n-2}}{n}$
9. $\displaystyle\sum_{n\geq 0} n^{2n} \left(\arcsin \frac{1}{2n^2+1}\right)^n$
10. $\displaystyle\sum_{n\geq 1} \frac{e^n}{n(e+1)^n}$
11. $\displaystyle\sum_{n\geq 0} \left(\frac{2n^2+1}{2n^2+3n+2}\right)^{n^2}$
12. $\displaystyle\sum_{n\geq 1} \frac{\left|\log(\cos \frac{1}{n})\right|^n}{n^n}$
13. $\displaystyle\sum_{n\geq 1} \frac{2^n (2n)!}{3^n (3n)!}$
14. $\displaystyle\sum_{n\geq 1} \frac{n(1+5^n)}{(n+1)!}$
15. $\displaystyle\sum_{n\geq 1} \frac{n!}{e^{n^3}} \tan \frac{1}{n^3}$
16. $\displaystyle\sum_{n\geq 1} \frac{n+\log_2 n}{2^n}$

17. $\sum_{n\geq 0} \frac{2^n + 3^n}{4^n + 5^n}$

18. $\sum_{n\geq 1} (-1)^n \frac{2}{\sqrt{n^2+1}}$

19. $\sum_{n\geq 0} (-1)^n \frac{e^n}{4^n}$

20. $\sum_{n\geq 1} (-1)^n \frac{e^{-\arccos\frac{1}{n}}}{n}$

21. $\sum_{n\geq 1} (-1)^n \arctan\log\left(1 + \frac{n+1}{n^2}\right)$

Integrazione di funzioni razionali (Formula di Hermite)

1. $\displaystyle\int \frac{dx}{x(3x+1)(x+1)}$
2. $\displaystyle\int \frac{2x-3}{4x^2-4x+1}dx$
3. $\displaystyle\int \frac{x+2}{x^2-4x+5}dx$
4. $\displaystyle\int \frac{x+3}{x^3+x^2-x-1}dx$

Integrazione per parti

1. $\displaystyle\int \cos\log x dx$
2. $\displaystyle\int \arctan\frac{1}{x+1}dx$
3. $\displaystyle\int (x^3+x)\sin 3x dx$
4. $\displaystyle\int e^x\cos x dx$
5. $\displaystyle\int \frac{\log x}{x^3}dx$

Sostituzione + Hermite

1. $\displaystyle\int \frac{\cos x}{\sin^2 x+3\sin x+2}dx$
2. $\displaystyle\int \frac{dx}{x(\log^2 x+4)}$
3. $\displaystyle\int \frac{e^x}{2e^{2x}+6}dx$
4. $\displaystyle\int \frac{1+\tan^2 x}{\tan^2 x+\tan x+1}dx$

Sostituzione + Integrazione per parti

1. $\displaystyle\int \frac{\log x\sin\log x}{x}dx$
2. $\displaystyle\int \sin x(\cos^2 x+1)e^{\cos x}dx$
3. $\displaystyle\int 2^x\arcsin(2^x+1)dx$
4. $\displaystyle\int e^{e^x+x}\cos e^x dx$