

Find a formula for the nth term of the sequence.

1) $1, -\frac{1}{4}, \frac{1}{9}, -\frac{1}{16}, \frac{1}{25}$ (reciprocals of squares with alternating signs)

2) $2, -2, 2, -2, 2$ (2's with alternating signs)

Find the limit of the sequence if it converges; otherwise indicate divergence.

3) $a_n = \frac{8 + 3n}{8 + 7n}$

4) $a_n = \frac{3n - 7}{7 + 8\sqrt{n}}$

5) $a_n = \ln(9n + 2) - \ln(2n + 6)$

6) $a_n = \frac{\ln(n + 5)}{n^{1/n}}$

Determine if the series converges or diverges; if the series converges, find its sum.

7) $\sum_{n=0}^{\infty} \sqrt{6}$

8) $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{5}{4^n}$

9) $\sum_{n=0}^{\infty} \frac{1}{(\sqrt{6})^n}$

10) $\sum_{n=1}^{\infty} \frac{6}{n(n+3)}$

11) $\sum_{n=1}^{\infty} \frac{6}{(4n-1)(4n+3)}$

12) $\sum_{n=1}^{\infty} \frac{4^{n+1}}{5^{n-1}}$

Determine whether the series converges or diverges.

$$13) \sum_{n=1}^{\infty} \frac{4}{\sqrt{n}}$$

$$14) \sum_{n=1}^{\infty} \frac{\cos 1/n}{n^2}$$

$$15) \sum_{n=1}^{\infty} \left(\frac{\ln n}{6n - 7} \right)^n$$

$$16) \sum_{n=1}^{\infty} \frac{1}{7^n - 1}$$

$$17) \sum_{n=1}^{\infty} \frac{1}{(\ln 6)^n}$$

$$18) \sum_{n=1}^{\infty} \frac{3n}{n^2 + 3}$$

$$19) \sum_{n=1}^{\infty} \frac{\sin n \cos n}{5^n}$$

$$20) \sum_{n=1}^{\infty} \frac{(2n)!}{3^n n!}$$

$$21) \sum_{n=1}^{\infty} \left(\frac{n}{10n + 7} \right)^n$$

$$22) \sum_{n=1}^{\infty} (-1)^n \left(\frac{4n^2 + 2}{5n^7 + 7} \right)$$

$$23) \sum_{n=1}^{\infty} \frac{1}{(\ln 4n)^n}$$

$$24) \sum_{n=1}^{\infty} (-1)^n \left(\frac{1}{2} - \frac{2}{n} \right)^n$$

$$25) \sum_{n=1}^{\infty} \frac{6^n}{n!}$$

$$26) \sum_{n=1}^{\infty} \frac{16}{n^{1/3}}$$

$$27) \sum_{n=1}^{\infty} \frac{4n^2 + 5}{n^5 + 4n + 4}$$

$$28) \sum_{n=1}^{\infty} \frac{(-1)^n}{6n^4 + 1}$$

$$29) \sum_{n=1}^{\infty} (-1)^n \left(\frac{5n^5 + 3}{3n^7 + 7} \right)$$

Find the interval of convergence of the series.

$$30) \sum_{n=0}^{\infty} (x - 4)^n$$

$$31) \sum_{n=0}^{\infty} \frac{(x - 4)^n}{n^4 4^n}$$

$$32) \sum_{n=1}^{\infty} \frac{(x - 7)^n}{(3n)!}$$

Find the Taylor series generated by f at x = a.

$$33) f(x) = \frac{1}{x}, a = 7$$

$$34) f(x) = \frac{1}{8 - x}, a = 2$$

$$35) f(x) = e^x, a = 5$$

Find the Maclaurin series for the given function.

$$36) e^{6x}$$

$$37) f(x) = x^6 e^x$$

$$38) \cos 10x$$

39) $f(x) = x^3 \sin x$

40) $\frac{\sin 7x}{x}$

Answer Key

Testname: T3SG

1) $a_n = \frac{(-1)^{n+1}}{n^2}$

2) $a_n = 2(-1)^{n+1}$

3) $\frac{3}{7}$

4) Diverges

5) $\ln\left(\frac{9}{2}\right)$

6) Diverges

7) Diverges

8) Converges; 1

9) Converges; $\frac{6 + \sqrt{6}}{5}$

10) $\frac{11}{3}$

11) $\frac{1}{2}$

12) Converges; 80

13) diverges

14) converges

15) Converges

16) diverges

17) converges

18) diverges

19) Converges

20) Diverges

21) Converges

22) Converges

23) Converges

24) Converges absolutely

25) Converges

26) Diverges

27) Converges

28) Converges

29) Converges absolutely

30) $3 < x < 5$

31) $0 \leq x \leq 8$

32) $-\infty < x < \infty$

33) $\sum_{n=0}^{\infty} \frac{(-1)^n (x - 7)^n}{7^{n+1}}$

34) $\sum_{n=0}^{\infty} \frac{(x - 2)^n}{6^{n+1}}$

35) $\sum_{n=0}^{\infty} \frac{e^5 (x - 5)^n}{n!}$

Answer Key

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$$36) \sum_{n=0}^{\infty} \frac{6^n x^n}{n!}$$

$$37) \sum_{n=0}^{\infty} \frac{x^{n+6}}{n!}$$

$$38) \sum_{n=0}^{\infty} \frac{(-1)^n 10^{2n} x^{2n}}{(2n)!}$$

$$39) \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+4}}{(2n+1)!}$$

$$40) \sum_{n=0}^{\infty} \frac{(-1)^n 7^{2n+1} x^{2n}}{(2n+1)!}$$