



Series

Questions

Partial Sums of an Infinite Series

The Sum of a Geometric Series

The Sum of a Telescoping Series

The Limit & Sum of an Infinite Series

Series Convergence Tests

Partial Sums of an Infinite Series

Q1) Determine whether the series converges or diverges using partial sums.

a) $\sum_{n=1}^{\infty} \frac{1}{2^n}$

c) $\sum_{n=1}^{\infty} \ln\left(1 + \frac{1}{n}\right)$

b) $\sum_{n=1}^{\infty} 1$

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

The Sum of a Geometric Series

Q1) Determine the sum of the convergent series.

a) $\sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^n$

c) $1 + 0.1 + 0.01 + \dots$

b) $\sum_{n=0}^{\infty} \left(-\frac{1}{2}\right)^n$

d) $\sum_{n=0}^{\infty} 3\left(\frac{3}{2}\right)^n$

The Sum of a Telescoping Series

Q1) Determine whether the telescoping series converges or diverges.

If it converges find the sum.

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

b) $\sum_{n=1}^{\infty} \frac{2}{4n^2 - 1}$

c) $\sum_{n=2}^{\infty} \frac{1}{n^2 - 1}$

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



The Limit & Sum of an Infinite Series

Q1) Determine whether the infinite series converges or diverges.

a) $\sum_{n=1}^{\infty} \frac{n+10}{10n+1}$

c) $\sum_{n=0}^{\infty} \frac{4}{2^n}$

b) $\sum_{n=1}^{\infty} \frac{n+1}{2n-1}$

d) $\sum_{n=0}^{\infty} \frac{1}{4^n}$

Series Convergence Tests

Q1) Determine the convergence or divergence of the series.

a) $\sum_{n=1}^{\infty} \frac{1}{n+1}$

c) $\sum_{n=1}^{\infty} e^{-n}$

b) $\sum_{n=1}^{\infty} \frac{1}{n^3}$

d) $\sum_{n=1}^{\infty} \frac{1}{4n+1}$

Q2) Determine the convergence or divergence of the p-series.

a) $\sum_{n=1}^{\infty} \frac{1}{n}$

c) $\sum_{n=1}^{\infty} \frac{1}{\sqrt[5]{n}}$

b) $\sum_{n=1}^{\infty} \frac{1}{n^2}$

d) $1 + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{4}} + \dots$

Q3) Determine whether the series converges or diverges.

a) $\sum_{n=0}^{\infty} 2^n$

c) $\sum_{n=1}^{\infty} \frac{1}{n}$

b) $\sum_{n=1}^{\infty} \frac{n!}{2n!+1}$

d) $\sum_{n=1}^{\infty} \frac{n}{n+1}$

Q4) Determine the convergence or divergence of the series using the direct comparison test.

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

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

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

d) $\sum_{n=0}^{\infty} e^{-n^2}$



Q5) Determine the convergence or divergence of the series using the limit comparison tests.

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

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

b) $\sum_{n=0}^{\infty} \frac{\sqrt{n}}{n^2 + 1}$

d) $\sum_{n=1}^{\infty} \sin \frac{1}{n}$

Q6) Determine the convergence or divergence of the series using the ratio test.

a) $\sum_{n=0}^{\infty} \frac{2^n}{n!}$

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

b) $\sum_{n=0}^{\infty} \frac{n!}{3^n}$

d) $\sum_{n=1}^{\infty} (-1)^n \frac{\sqrt{n}}{n+1}$

Q7) Determine the convergence or divergence of the series using the root test.

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

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

b) $\sum_{n=1}^{\infty} \frac{e^{2n}}{n^n}$

d) $\sum_{n=2}^{\infty} \frac{(-1)^n}{(\ln n)^n}$

Q8) Determine the convergence or divergence of the alternating series.

a) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n}$

c) $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$

b) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{2n-1}$

d) $\sum_{n=1}^{\infty} \frac{(-1)^n n^2}{n^2 + 1}$