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Lesson 10.2: Convergent/Divergent Series, Geometric Series, & the nth Term Test

Series

A sequence is an ________________________ of numbers.

In this lesson, we will be working with series, which is the _____________ of these numbers.

An infinite series can be represented as:

Examples:

1. What happens as more and more terms of a series like: $\sum_{n=0}^{\infty}(2n+1) = 1+3+5+7+\cdots$ are added together?

   When this happens the series is called ______________________ .

2. What happens as more and more terms of $\sum_{n=1}^{\infty}\frac{3}{10^n} =$ are added?

   This is an example of a _____________________ geometric series.

Geometric Series

If consecutive terms in a series have a common ratio _____ , the series is called a geometric series.

1. $\sum_{n=0}^{\infty} \frac{3}{2^n}$

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

3. $\sum_{n=1}^{\infty} 4\left(-\frac{1}{2}\right)^n$

4. Find the fraction form of the repeating decimal of $.\overline{08}$ using a geometric series.

The nth Term Test of a Series

In general, convergence of a series is less simple than convergence of a sequence.

The sequence $\{a_n\} = \left\{1 + \frac{1}{n}\right\}$ converges because $\lim_{n\to\infty} a_n =$

However, the series $\sum_{n=1}^{\infty}\left(1 + \frac{1}{n}\right) = (1+1) + \left(1 + \frac{1}{2}\right) + \left(1 + \frac{1}{3}\right) + \cdots$ does not converge.

A series ___________________________ unless the terms approach a limit of ___________ .

nth Term Test for Divergence:

Example: Show that $\sum_{n=1}^{\infty}\frac{n!}{2n!+1}$ diverges.