Section 9.2 Series

**Sequence**: a1, a2, a3, . . . **Series**: a1 + a2 + a3 + . . . =

**Partial Sums**: S1 = a1

S2 = a1 + a2

S3 = a1 + a2 + a3

Sn = a1 + a2 + a3 + . . .+ an

**Sequence of Partial Sums**: S1, S2, S3, . . . ,Sn

The sum of an infinite series is the limit of its sequence of partial sums.

**Example**: 1 – 1 + 1 – 1 + 1 – . . . Converge or Diverge? ( Does it have a finite sum? )

Example: = Converge or Diverge?

Since finding a formula for the terms of the sequence of partial sums of an infinite series is sometimes difficult to find, we have several tests to determine the convergence of a series.

**Nth term test for divergence**

Does the sequence Converge or Diverge? Does the series Converge or Diverge?

Does the sequence Converge or Diverge? Does the series Con. or Div.?

Does the sequence Converge or Diverge? Does the series Con. or Div.?

Nth term test for divergence: Given , If , then the series diverges.

(If the limit does equal zero, we do not know if the series converges or diverges)

Properties of Series:

**Telescopic Series**

Coverge or Diverge?

**Geometric Series**

What is the recursive pattern used to generate the next term?

A **geometric sequence** is created by multiplying by a common ratio (r) to get the next term.

A **geometric series** is the sum of a geometric sequence.

You learned in a previous math class a formula for the sum of a geometric series. If you don’t remember it, it will need to be derived.

* Given the geometric series , you are multiplying by r to get each additional term

multiply both sides of the eqn. by r

then subtract the bottom equation from the top

Factor out Sn

Solve for Sn

this is the formula to generate the terms of the sequence of partial sums

So the limit of Sn as n approaches infinity gives you the sum of the infinite series

if , but

Therefore, if you recognized a series as geometric, i.e. ,

If , the geometric series diverges. If , the geometric series converges to

Where a is the first term and r is the common ratio.

Examples: Converge or Diverge?

0.252525252525…