Section 9.5 Alternating Series

Alternating Series have terms that alternate positive and negative values. (recursive formula will involve -1 raised to a power)

Example:

**Alternating Series Test**

If an alternating series, satisfies both conditions for all , then the alternating series converges.

1. and (2)

If condition (2) is not satisfied, the test is inconclusive.

Example:

Terms are approaching zero (condition 1), but each successive term is not necessarily less than the one before it (condition 2). Therefore, the alternating series test is inconclusive.

Examples:

Alternating Series can be classified as **absolutely convergent** or **conditionally convergent**.

is absolutely convergent if converges.

is conditionally convergent if converges, but diverges.

converges conditionally because the alternating series converges, but the

non-alternating series diverges. Does converge absolutely or conditionally?

**Estimating Alternating Series**

Estimate

0 ½ 1

S1

S2

S3

S4

The accuracy of our estimation depends on how many terms we include in the partial sum.

**Error** is the difference between the exact value and the estimate. Error is also called the **remainder**.

Error/Remainder =

The maximum value of the error must be less than the next term.

**Example**: If we use the 4th partial sum to estimate

our error must be less than the 5th term.

S4 = a5 = So the actual sum must be

In other words, our sum falls between < S <

**You try**: Given the alternating series

Use 6 terms to estimate the sum and find the maximum amount of error in your estimate.