

SECTION 5.5: ALTERNATING SERIES

(1) An *alternating series* has the form:

(2) Example A: (!!)
$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n}$$

(3) The Alternating Series Test

(4) Determine whether the alternating series below converge or diverge. Justify your conclusion.

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

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

(5) Remainders in Alternating Series and How to Estimate Them

(6) Consider the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2}$.

(a) Show the series converges.

(b) Find S_3 , estimate R_3 , and interpret your answers.

(c) Determine how large k needs to be so that the k th partial sum, S_k , is within $0.0001 = 10^{-4}$ of the sum of the series?

(7) **Definitions:** Absolute and Conditional Convergence

(8) For each series below, determine if the series is absolutely convergent, conditionally convergent, or divergent.

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

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