

## Alternating Series

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**Solutions should show all of your work, not just a single final answer.**

1. Define an alternating series and state the alternating series test.

2. Let  $s = \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{2n-1}$ .

(a) Write out the first 6 *terms* of this series as fractions and the first 6 *partial sums* of this series as decimals rounded to 4 decimal places.

(b) Explain why  $s$  converges using the alternating series test.

(c) Let  $s_n$  be the  $n$ th partial sum in this series. Use the error estimate for the partial sums of an alternating series to carry out the following two tasks:

(i) Give a bound from above on  $|s - s_{100}|$ , as a decimal rounded to four digits after the decimal point.

(ii) Find an  $n$  for which  $|s - s_n| \leq 1/100$ .

3. T/F (with justification)

The infinite series  $\sum_{n=1}^{\infty} \frac{\cos n}{n}$  is alternating.