Theorem: If an alternating series satisfies the hypotheses of the alternating series test, and S is the sum of the series and S is approximated by the n^th^ partial sum s_n, then the absolute error $|S - s_n|$ satisfies $\left|S - s_n\right| \le a_{n+1}$.

In words, this theorem says that if you approximate the sum of a converging alternating series by its n^{th} partial sum, then the maximum error that results is the $(n + 1)^{st}$ term.

Each of the following series converges. Approximate the sum of the series to 2 decimal place accuracy.

1. $1 - \frac{1}{3!} + \frac{1}{5!} - \frac{1}{7!} + - \ldots$
2. $1 - \frac{1}{2!} + \frac{1}{4!} - \frac{1}{6!} + - \ldots$
3. $\sum_{k=1}^{\infty} (-1)^{k+1} \frac{1}{k \cdot 2^k}$