Section 12.5 (Alternating Series)

Example: Which of the following are alternating series?

1. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$

2. $\displaystyle\sum_{n=1}^{\infty} \frac{\cos n}{n^2}$

3. $\displaystyle\sum_{n=1}^{\infty} \frac{(-2)^n}{(-3)^{n+1}}$

4. $\displaystyle\sum_{n=1}^{\infty} (-1)^{n-3}\frac{e^n}{n!}$

5. $\displaystyle\sum_{n=1}^{\infty} \frac{-n}{3^n}$

Examples: Do the following converge or diverge?

1. The Alternating Harmonic Series, $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n}$

2. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n 3n^2}{n^2 - n}$

3. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}(n-2)}{n!}$

Estimating Sums Examples:

1. For the alternating harmonic series, $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n}$, for what n will the estimate s_n be within 0.001 of s?

2. For the convergent alternating series, $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n!}$, for what n will the estimate s_n be within 0.001 of s?