1. For each of the following series, determine whether the series converges or diverges.

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

(c) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} e^{\frac{1}{n}}$

(b) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n} \frac{n}{2n-5}$

(d) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} \left(\frac{\ln n}{n}\right)$

2. Estimate the sum of the following series to within two decimal places of accuracy

(a) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n} \frac{n^2}{10^n}$

(b) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} \frac{7}{n^5}$

3. Determine how many terms you would need to add up in order to estimate the following sums to within .0001 (you do **not** need to find an estimate)

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

   (b) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n} \frac{4^n}{n^n}$

4. Determine whether each of the following series are absolutely convergent, conditionally convergent, or divergent:

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

   (c) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} \frac{\sqrt{n}}{n+1}$

   (b) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} \frac{3n}{500n+1}$

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

(e) $\displaystyle\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n}$

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

5. (a) Estimate the sum of the following series by calculating S_{10} and S_{25} (approximate to four decimal places):

   i. $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \frac{1}{7} - \frac{1}{8} + \frac{1}{9} - \frac{1}{10} \dots$

   ii. $1 + \frac{1}{3} - \frac{1}{2} + \frac{1}{5} + \frac{1}{7} - \frac{1}{4} + \frac{1}{9} + \frac{1}{11} - \frac{1}{6} + \frac{1}{13} + \frac{1}{15} - \frac{1}{8} \dots$

   (b) Do they appear to sum to the same value, or different values? Notice that the second series is really just the first series with its terms rearranged. What is going on here, and what does this tell you about conditional convergence?