1. Write each sum in series notation, assuming the pattern continues infinitely.

   (a) $1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \ldots$

   (b) $10 - 2 + 0.4 - 0.08 + \ldots$

   (c) $0.999\ldots = 0.9 + 0.09 + 0.009 + \ldots$

2. For each series below, write at least five terms of the sequence of partial sums and the general term if possible. Use the sequence of partial sums to speculate/determine whether the series converges or diverges.

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

   (b) $\displaystyle\sum_{n=0}^{\infty} n$

   (c) $\displaystyle\sum_{n=0}^{\infty} \frac{3}{10^n}$

   (d) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n}$ Hint: Use technology to calculate the partial sums with $2, 4, 8, 16, \ldots$ terms.

   (e) $\displaystyle\sum_{n=0}^{\infty} (-1)^n$

   (f) $\displaystyle\sum_{n=1}^{\infty} \ln(n)$

3. For which of the series above do the terms of the series go to zero? Is this related to whether or not the series converges? If so, how?