READ ME FIRST:      Show me all the magic very neatly on the page, for I do not read minds. Use correct notation when presenting your computations and arguments. Use complete sentences. Remember this: "=" denotes "equals" , "⇒" denotes "implies" , and "⇔" denotes "is equivalent to".      Since the answer consists of all the magic transformations, do not "box" your final results. Eschew obfuscation.

**1. (4 pts.)**      Find the general term of the sequence, starting with $n = 1$, determine whether the sequence converges, and if so, find its limit.

$$\frac{1}{3}, \; -\frac{1}{9}, \; \frac{1}{27}, \; -\frac{1}{81}, \; \dots \; .$$

**2. (2 pts.)**      Express the repeating decimal as a fraction.

$0.4444\ldots =$

**3. (2 pts.)**      [Complete the following.]   The harmonic series has the form

$$\sum_{k=1}^{\infty}$$

What is the sum of the harmonic series?

**4. (8 pts.)**      Determine whether the series converges, and if so, find its sum.

(a)      $\displaystyle\sum_{k=1}^{\infty} \left( -\frac{3}{4} \right)^{k-1}$

(b)      $\displaystyle\sum_{k=1}^{\infty} \frac{1}{(k+2)(k+3)}$

**5. (4 pts.)**      Find all values of x for which the series converges, and find the sum of the series for those values of x.

$$\frac{1}{x^2} + \frac{2}{x^3} + \frac{4}{x^4} + \frac{8}{x^5} + \frac{16}{x^6} + \ldots$$