1. For the following sequences, evaluate the limit, or determine the sequence diverges.

   a) $\{\frac{2n}{5n-1}\}$

   b) $a_n = \sqrt[n]{n}$

   c) $\{0, 1, 0, 1, ...\}$

   d) $\{-3, 2, -\frac{4}{3}, \frac{8}{9}, -\frac{16}{27}, ...\}$

   e) $\{\frac{(n-1)!}{n!}\}$

   f) $a_n = \frac{(\ln n)^2}{n}$

   g) $a_n = \frac{1}{2}a_{n-1}$, $a_0 = 100$

2. For each series, write the first four terms of the sum. Then evaluate the series.

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

   b)
   $$\sum_{n=0}^{\infty} \left(\frac{2^{n+1}}{5^n}\right)$$

   c)
   $$\sum_{n=2}^{\infty} \left(\frac{1}{\sqrt{n}} - \frac{1}{\sqrt{n+1}}\right)$$

   d)
   $$e^{-1} + e^{-2} + e^{-3} + ...$$

3. Do the following series converge or diverge? Why or why not?

a)
$$\sum_{n=1}^{\infty} (\ln(n) - \ln(n+1))$$

b)
$$\sum_{n=1}^{\infty} \frac{2^n}{3^n}$$

c)
$$\sum_{n=1}^{\infty} \frac{5^n}{4^n + 3}$$

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

e)
$$\sum_{n=1}^{\infty} (\sqrt{2})^n$$

f) A series whose n^{th} partial sum is $s_n = \frac{ln(2n)}{ln(n)}$

g)
$$\sum_{n=1}^{\infty} \left(1 - \frac{2}{n}\right)^n$$

4. Express the following decimals as a ratio of integers

a) $0.\overline{5} = 0.555..$

b) $0.\overline{31} = 0.313131...$

c) $0.\overline{9} = 0.999...$ (ask your LA to make sure this is right!)