12.3 Day 3 What is $.3+.03+.003+.0003+\ldots$ equal to?

The expression is an infinite series which can be written as $\sum_{n=1}^{\infty} u_n = u_1 + u_2 + u_3 + \ldots + u_n + \ldots$

Find the first 4 partial sums of the series to determine an expression for the nth partial sum. Then evaluate the limit of the expression as n→∞.

$$\sum_{n=1}^{\infty} \frac{1}{n+3} - \frac{1}{n+4}$$

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

Using Partial Fraction Decomposition to find the sums of telescoping series

Show that the series $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$ is convergent and find its sum.

- First simplify the expression using partial fraction decomposition.
- Find an expression for the nth partial sum
- Take the limit the expression for the nth partial sum as n→∞

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

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

$$\sum_{n=1}^{\infty} \frac{1}{4n^2 - 1}$$

$$\sum_{n=3}^{\infty} \frac{2}{n^2 - 2n}$$