Section 11.2: Series

Problem 1. Determine whether the series is convergent or divergent by expressing its partial sum $s_n = \sum_{i=1}^{n} a_i$ as a telescoping sum. If it is convergent, find its sum.

(a) $\sum_{n=1}^{\infty} \frac{3}{n(n+3)}$. **Hint:** Express $\frac{3}{i(i+3)} = \frac{A}{i} + \frac{B}{i+3}$ and find A and B by the Method of Partial Fractions.

(b) $\sum_{n=1}^{\infty} \ln\left(\frac{n}{n+1}\right)$. **Hint:** $\ln\left(\frac{A}{B}\right) = \ln(A) - \ln(B)$.

Problem 2. Determine whether the geometric series is convergent or divergent. If it is convergent, find its sum.

(a) $2 + 0.5 + .125 + 0.03125 + \cdots$

(b) $\sum_{n=1}^{\infty} \frac{e^{2n}}{6^{n-1}}$.

Problem 3. Determine whether the series is convergent or divergent. If it is convergent, find its sum.

(a) $\frac{1}{3} + \frac{1}{6} + \frac{1}{9} + \frac{1}{12} + \frac{1}{15} + \cdots$

(b) $\sum_{n=1}^{\infty} [(-0.2)^n + (0.6)^{n-1}]$.

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

(d) $\sum_{n=1}^{\infty} \left(\frac{3}{5^n} + \frac{2}{n}\right)$.