

Supplementary Homework Exercises for Section 11.2: Series (part 2)

Exercises

Answer each of the following questions.

S1. Let $a_n = \frac{2n}{3n+1}$.

- (a) Determine whether $\{a_n\}$ converges.
- (b) Determine whether $\sum_{n=1}^{\infty} a_n$ converges.

S2. Determine whether each of the following series is convergent or divergent. If the series converges, find its sum.

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

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

(c) $\sum_{n=1}^{\infty} \frac{1+2^n}{3^n}$

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

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

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

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

S3. What is wrong with the following calculation?

$$\begin{aligned}
 0 &= 0 + 0 + 0 + \cdots \\
 &= (1-1) + (1-1) + (1-1) + \cdots \\
 &= 1-1+1-1+1-1+\cdots \\
 &= 1 + (-1+1) + (-1+1) + (-1+1) + \cdots \\
 &= 1 + 0 + 0 + 0 + \cdots \\
 &= 1
 \end{aligned}$$