(1) Determine whether the series is convergent or divergent by expressing s_n as a telescoping sum. If it is convergent, find its sum.

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

(2) If the n-th partial sum of a series $\displaystyle\sum_{n=1}^{\infty} a_n$ is

$$s_n = \frac{n-1}{n+1},$$

find a_n and $\displaystyle\sum_{n=1}^{\infty} a_n$.

(3) Use the Comparison Test to determine whether the series is convergent or divergent.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{n}{2n^3+1}$ (b) $\displaystyle\sum_{n=2}^{\infty} \frac{n^3}{n^4-1}$

(4) Test the series for convergence or divergence.

(a) $\frac{4}{7} - \frac{4}{8} + \frac{4}{9} - \frac{4}{10} + \frac{4}{11} - \cdots$

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

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{\ln(n+4)}$

(d) $\displaystyle\sum_{n=1}^{\infty} (-1)^n \cos\left(\frac{\pi}{n}\right)$

(5) Determine whether the series is convergent or divergent.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{2}{n^{0.85}}$

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

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2+9}$

(d) $\displaystyle\sum_{n=1}^{\infty} \frac{n^2-5n}{n^3+n+1}$

(e) $\displaystyle\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$

(f) $\displaystyle\sum_{n=1}^{\infty} ne^{-n}$

(g) $\displaystyle\sum_{n=1}^{\infty} \frac{\cos^2 n}{n^2+1}$

(h) $\displaystyle\sum_{n=1}^{\infty} \frac{n-1}{n4^n}$

(i) $\displaystyle\sum_{n=1}^{\infty} \frac{4+3^n}{2^n}$

(j) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^3+1}}$

(6) Determine whether the series is absolutely convergent.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{(-3)^n}{n^3}$

(b) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n-1} \frac{\sqrt{n}}{n+1}$

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{n!}{100^n}$

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