1. Determine whether the sequence converges or diverges. If it converges, find the limit.

   (a) $a_n = \dfrac{3+5n^2}{n+n^2}$

   (b) $a_n = \ln(n+1) - \ln(n)$

   (c) $a_n = \dfrac{n^2}{\sqrt{n^3+4n}}$

   (d) $\{0, 1, 0, 0, 1, 0, 0, 0, 1, \cdots\}$

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

   (a) Determine whether $\{a_n\}$ is convergent.

   (b) Determine whether $\displaystyle\sum_{n+1}^{\infty} a_n$ is convergent.

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

   (a) $2 + 0.5 + 0.125 + 0.03125 + \cdots$

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

4. Determine whether $s_n = \displaystyle\sum_{n=2}^{\infty} \frac{1}{n^3 - n}$ is convergent or divergent by expressing it as a telescoping sum. Find the sum if it's convergent.

Cont.

5. Express $0.\overline{46} = 0.46464646\cdots$ as a ratio of integers.

6. Find the values of x for which the series $\sum_{n=1}^{\infty}(-5)^n x^n$ converges. Find the sum of the series for those values of x.

7. Use the integral test to determine whether the series $\sum_{n=1}^{\infty} n^2 e^{-n^3}$ is convergent or divergent.

8. Determine whether the series $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$ is convergent or divergent.

Cont.

9. Determine whether the series converges or diverges.

   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{9^n}{3+10^n}$

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

   (c) $\displaystyle\sum_{k=1}^{\infty} \frac{\sqrt[3]{k}}{\sqrt{k^3+4k+3}}$

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

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

10. Test the series for convergence or divergence.

    (a) $-\frac{2}{5}+\frac{4}{6}-\frac{6}{7}+\frac{8}{8}-\frac{10}{9}+\cdots$

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

Cont.

11. For what values of p is the series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^p}$ convergent?

12. Determine whether the series is absolutely convergent or conditionally convergent.

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

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

13. Use the ratio test to determine whether the series is convergent or divergent.

    (a) $\displaystyle\sum_{n=1}^{\infty} \frac{n}{5^n}$

    (b) $\displaystyle\sum_{n=1}^{\infty} \frac{\cos(n\pi/3)}{n!}$

Cont.

14. For which of the following series is the ratio test inconclusive (that is, it fails to give a definite answer)?

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

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

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

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

15. Use the root test to determine whether the series is convergent or divergent.

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

(b) $\displaystyle\sum_{n=0}^{\infty} (\arctan n)^n$

The End.