Infinite Series Practice

1. Determine whether the series converges or diverges. If the series converges, find the sum.

$a)\ \sum_{n=0}^{\infty}\left(\frac{4}{5}\right)^n$

$b)\ \sum_{n=0}^{\infty}\left(\frac{\pi}{3}\right)^n$

$c)\ \sum_{n=0}^{\infty}(.64)^n$

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

2. Express the following as a ratio of integers.

$a)\ 0.1212\overline{12}$

$b)\ 4.3737\overline{37}$

3. Determine whether the series converges or diverges. If it converges, find its sum.

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

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

4. Determine whether the series converges or diverges.

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

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

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

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

5. Test the series for convergence or divergence.

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

$b)\ \sum_{n=1}^{\infty} \frac{1}{3^n+1}$

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

6. Determine whether the series converges or diverges.

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

$b)\ \sum_{n=2}^{\infty} \frac{1}{\sqrt{n^3 - 1}}$

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

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

7. Determine whether the series converges or diverges.

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

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

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

8. Test the series for absolute convergence.

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

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

$$c)\ \sum_{n=0}^{\infty} (-1)^n \frac{n}{n^2+1}$$

9. Test the series for convergence or divergence.

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

$b)\ \sum_{n=0}^{\infty} \frac{2^n}{n!}$

$c)\ \sum_{n=0}^{\infty} \frac{(n+1)!}{n!}$

$d)\ \sum_{n=1}^{\infty} \frac{n^4}{3^n}$