

Directions: Show all work on a separate sheet of paper for full credit.

1. What can you say about the series  $\sum a_n$  in each of the cases?

(a)  $\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| = 8$

(b)  $\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| = 0.8$

(c)  $\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| = 1$

2. Determine whether the series  $\sum_{n=0}^{\infty} \frac{(-1)^n}{5n+1}$  is absolutely convergent or conditionally convergent.

3. Determine whether the series  $\sum_{n=0}^{\infty} \frac{(-1)^n}{n^2+1}$  is absolutely convergent or conditionally convergent.

4. Use the Ratio Test to determine whether the series is convergent or divergent.

(a)  $\sum_{n=0}^{\infty} \frac{(-3)^n}{(2n+1)!}$

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

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

(d)  $\sum_{n=1}^{\infty} \frac{n^{10}}{(-10)^{n+1}}$

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

5. Use the Root Test to determine whether the series is convergent or divergent.

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

(b)  $\sum_{n=1}^{\infty} \left( \frac{-2n}{n+1} \right)^{5n}$