

1. TEST FOR CONVERGENCE AND INTERVAL OF CONVERGENCE.

For the following problems, determine if the series converge or diverge. Show all work and state which theorem/convergence test you are using.

1. A. $\sum_{n=1}^{\infty} \frac{1}{2^n + 3}$ B. $\sum_{n=1}^{\infty} \frac{4n^2 + n}{n^4 + 3}$ C. $\sum_{n=1}^{\infty} 2^n$

D. $\sum_{n=1}^{\infty} \frac{2n + 1}{5n^2}$ E. $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{2^n}$ F. $\sum_{n=1}^{\infty} \frac{1}{(n + 1)!}$

2. Consider the series, $\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$.

A. Explain why the ratio test does not work in this case for showing convergence or divergence. Show your work.

B Determine if this series converges or diverges by using the Limit comparison test.

3. Determine the radius of convergence and the interval of convergence in the following problems. Show all work.

A. $\sum_{n=0}^{\infty} \frac{x^n}{4^n}$ B. $\sum_{n=1}^{\infty} \frac{(x - 4)^n}{n}$ C. $\sum_{n=0}^{\infty} \frac{x^n (4n)!}{(n!)^2}$

D. $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} x^n}{(3n)!}$ E. $\sum_{n=1}^{\infty} \frac{x^n}{2^n n^2}$ F. $\sum_{n=1}^{\infty} (x - 1)^n e^n$

4. Determine if the following series is absolutely convergent, conditionally convergent or divergent. $\sum_{n=1}^{\infty} (-1)^n \frac{2n}{3n + 1}$.