

1. Determine if the alternating series converges or diverges. Fully justify your conclusion.

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

2. Use the Ratio Test to determine if the series converges or diverges. Fully justify your conclusion.

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

3. Use a Comparison Test (either Direct Comparison Test or Limit Comparison Test) to determine if each series converges or diverges. Fully justify your conclusion.

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

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

4. Determine if the series converges absolutely, converges conditionally, or diverges. Fully justify your conclusion.

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

5. The series below is a convergent alternating series. Use the Alternating Series Remainder Estimate to determine the minimum number of terms needed to approximate the value of the series to within 0.0001.

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

6. The series below is a convergent series that satisfies the conditions of the Integral Test.

$$\sum_{n=0}^{\infty} e^{-2n}$$

- (a) Show that this series converges using the Integral Test. (You do not have to check the conditions.)
- (b) Use the Integral Test Remainder Estimate to determine the minimum number of terms needed to estimate the value of the series to within 0.005.

7. Find the 3rd degree Taylor polynomial for $f(x) = \sqrt{x}$ centered at $a = 1$.

8. Find the radius and interval of convergence for the power series.

$$\sum_{n=0}^{\infty} \frac{(x-5)^n}{2^n \ln n}$$