

1. Determine whether each of the following series converges absolutely, converges conditionally, or diverges. Give reasons.

(a)  $\sum_{n=1}^{\infty} \frac{(-4)^n}{n3^{2n+1}}$

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

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

2. Find a power series for the function  $f(x) = \frac{x}{(x+2)^2}$ . Give the interval of convergence.

3. Find the interval of convergence for each power series.

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

(b)  $\sum_{n=1}^{\infty} \frac{(x-1)^n}{n3^n}$ .

4. Use a power series to estimate the value of  $\int_0^{\frac{1}{2}} \frac{1}{1+2x^2} dx$  with an error of less than  $10^{-4}$ .

5. Find the fourth-order Taylor polynomial for  $f(x) = (x+1)^{\frac{2}{3}}$  about  $a = 0$ .

Use it to estimate the value of  $(1.1)^{\frac{2}{3}}$ . Give an upper bound for the error in your estimate.

6. Find the sum of the series  $\sum_{n=1}^{\infty} \frac{n3^n}{10^{n+1}}$