1. Determine whether the following series is convergent or divergent.

   (i). \( \sum \frac{n!}{2n^2} \)

   (ii). \( \sum \left( \frac{n^2 + 1}{2n^2 + 1} \right)^n \)

2. Determine whether the following series is absolutely convergent, conditionally convergent or divergent.

   (i). \( \sum \frac{(-1)^n \tan^{-1} n}{n^2} \)

   (ii). \( \sum \left(-\frac{2}{n}\right)^n \)

3. \( \{b_n\} \) is a sequence and \( \lim_{n \to \infty} b_n = \frac{1}{2} \). Determine whether the given series is absolutely convergent, conditionally convergent or divergent.

   \[ \sum \frac{(-1)^n n!}{n^n b_1 b_2 \ldots b_n} \]

4. Find all the values for \( k \) such that the series

   \[ \sum \frac{(n!)^2}{(kn)!} \]

   converges.

5. Find the radius of convergence and interval of convergence of the power series.

   (i). \( \sum_{n=1}^{\infty} \frac{n}{4^n} (x + 1)^n \)

   (ii). \( \sum_{n=1}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!} \)

6. Let \( p \) and \( q \) be real numbers with \( p < q \). Find a power series whose interval of convergence is \([p, q)\).