Absolute Convergence and the Ratio Test

Solutions should show all of your work, not just a single final answer.

1. Define an absolutely convergent series and a conditionally convergent series, and state the ratio test.

2. Use the ratio test to determine whether the following infinite series converge or diverge.

   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{n}{3^n}$. (This was already done with the Integral Test in Worksheet 11.3.)

   (b) $\displaystyle\sum_{n=0}^{\infty} \frac{(-2)^n}{n!}$.

   (c) $\displaystyle\sum_{n=0}^{\infty} \frac{(2n)!}{(n!)^2}$.

3. For the following infinite series, determine which are absolutely convergent, which are conditionally convergent, and which are neither. Mention all convergence tests you use.

   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{2n-1}$. (This was already met in Worksheet 11.5.)

   (b) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$.

   (c) $\displaystyle\sum_{n=1}^{\infty} \frac{n \sin n}{3^n}$.

4. T/F (with justification)

   Convergence of a p-series for $p > 1$ can be shown with the ratio test.

5. T/F (with justification)

   There is an infinite series whose terms can be rearranged to be an infinite series with a different value.