10.5 Absolute Convergence, Ratio, Root Test

Main Ideas

- **Absolute Convergence**

$$\text{If} \quad \sum_{n=1}^{\infty} |a_n| \quad \text{converges, then} \quad \sum_{n=1}^{\infty} a_n \quad \text{converges}$$

- **Ratio Test**

$$\text{If} \quad \lim_{n\to\infty} \left| \frac{a_{n+1}}{a_n} \right| = \rho \quad \text{then the series} \quad \sum_{n=1}^{\infty} a_n$$

1. **Converges** if $\rho < 1$
2. **Diverges** if $\rho > 1$
3. **Inconclusive** if $\rho = 1$

- **Root Test**

$$\text{If} \quad \lim_{n\to\infty} \sqrt[n]{|a_n|} = \rho \quad \text{then the series} \quad \sum_{n=1}^{\infty} a_n$$

1. **Converges** if $\rho < 1$
2. **Diverges** if $\rho > 1$
3. **Inconclusive** if $\rho = 1$