

## Sequences and Series

- Find the radius and interval of convergence of  $\sum_{k=1}^{\infty} \frac{(2x-1)^k}{k^2+1}$ .
- Find the Maclaurin series for  $f(x) = x^2 \cos 3x$ .
- Determine whether the sequence  $\{n \sin \pi n\}_{n=1}^{\infty}$  converges. If so, find its limit.
- Determine whether each of the following series converges:
  - $\sum_{k=1}^{\infty} \frac{k!}{e^{k^2}}$
  - $\sum_{k=1}^{\infty} \frac{3^k}{2^k + 4^k}$
  - $\sum_{k=1}^{\infty} \frac{1}{k(\ln k)(\ln \ln k)}$
  - $\sum_{k=1}^{\infty} \left( \frac{k^2}{3k^2 - 1} \right)^k$
  - $\sum_{k=1}^{\infty} k \sin \frac{1}{k}$
- Determine whether the sequence  $\{10 - .99^n\}_{n=1}^{\infty}$  is monotone.
- Find the first four nonzero terms of the Maclaurin series for  $f(x) = \cos x \sin 2x$ .
- Determine whether the series  $\sum_{k=1}^{\infty} \left( \frac{4}{5} \right)^k$  converges. If so, find its sum.
- Determine whether the series  $\sum_{k=1}^{\infty} \frac{(-1)^{k+1}}{10^{\frac{1}{k}}}$  converges absolutely, converges conditionally, or diverges.