

## 1 Main Topics

1. Definition of the limit of a sequence on page 557.
2. Definition of the convergence of a series on page 567.
3. Techniques of limit computations:
  - Non-existence of oscillating sequence:  $\{(-1)^n + 2\}$ .
  - change a sequence to a function, example 4 on page 558.
  - Squeeze Theorem on page 559.
  - Absolute Value Theorem on page 560.
  - Bounded and monotonic sequences on page 563.
4. Convergence of special Series:
  - Geometric Series on page 569.
  - $p$ -series on page 579.
  - Telescoping series on page 568.
5. Tests for series convergence:
  - $n$ th-term test on page 571.
  - The integral test on page 577.
  - Limit comparison test on page 585.
  - Alternating series test on page 590.
  - The ration test on page 597.
  - The root test on page 600.
6. Strategies for testing series on page 601.
7. Important sequence limits used frequently:
  - $\lim_{n \rightarrow \infty} \sqrt[n]{n} = 1$ .
  - $\lim_{n \rightarrow \infty} \frac{\ln n}{n} = 0$ .
  - $\lim_{n \rightarrow \infty} x^n = 0$  ( $|x| < 10$ ).
  - $\lim_{n \rightarrow \infty} x^{1/n} = 1$  ( $x > 0$ ).
  - $\lim_{n \rightarrow \infty} \left(1 + \frac{x}{n}\right)^n = e^x$  (any  $x$ ).
  - $\lim_{n \rightarrow \infty} \frac{x^n}{n!} = 0$  (any  $x$ ).

8. Taylor polynomial on page 607.
9. Methods of finding Radius and interval of convergence of a power series, examples on page 618 and 619.
  - By Geometric power series.
  - By the root test.
  - By the ratio test.
  - check endpoints for the interval of convergence.
10. Methods of finding a power series expansion of a function:
  - By Geometric power series, example 1 on page 626.
  - By integration, example 5 on page 629
  - By Differentiation, example 8 on page 622.
  - By direct substitution, example 6 on page 638.
  - By partial fractions, example 3 on page 627.
  - By Taylor series, example 1 on page 633.

## 2 Review Exercises

Review all problems handed out on Fridays.