

Contents:

1. Sequences of real numbers:
  - Sequences and their limits.
  - Some standard limits.
  - Supremum and infimum of a set of real numbers
  - Monotone convergence theorem.
  - Subsequences.
  - liminf and limsup of a sequence.
  - Cauchy sequences, Cauchy's criterion for convergence.
2. Series of real numbers:
  - Infinite series of real numbers, partial sums, convergence and divergence of series.
  - Tests for convergence/divergence of a series:
    - The n-th term test for divergence, Comparison test and limit comparison test,
    - Integral test, Ratio test, (Simplified) root test.
  - Alternating series: alternating series test.
  - Absolute convergence, conditional convergence.
3. Sequences and series of functions:
  - Sequences of functions: pointwise convergence and uniform convergence.
  - Cauchy's criterion for a sequence of functions.
  - Importance of uniform convergence of a sequence of functions: continuity, differentiation and integration of the limiting function.
  - Series of functions: pointwise and uniform convergence, Weierstrass M-test.
  - Continuity of a series of function, and term-by-term differentiation/integration.
  - Power series, radius and interval of convergence.
  - Taylor series. Some standard Taylor series.
4. Ordinary differential equations (ODE).
  - Classification of differential equations.
  - Review of 1st order ODE:
    - the method of separation of variables,
    - the method of integrating factors.
  - Homogeneous linear 2nd order ODE with constant coefficients.
  - Non-homogeneous linear 2nd order ODE with constant coefficients:
    - To find a particular solution by comparing coefficients,
    - The general solutions.