

MA2108 Advanced Calculus II (2001/2002, Semester I)

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.