

Analysis I (I am Sleepy) (Part 1A)

Limits and Convergence

Sequences and series in \mathbb{R} and \mathbb{C} . Sums, products and quotients. Absolute convergence. Absolute

Convergence implies convergence. The Bolzano

Weierstrass theorem and applications (the general principle of convergence). Comparison and ratio tests, alternating series test.

Continuity

Continuity of real and complex valued functions defined on subsets of \mathbb{R} and \mathbb{C} . The intermediate value theorem.

A continuous function on a closed bounded interval is bounded and attains its bounds

Differentiability

Differentiability of functions from \mathbb{R} to \mathbb{R} . Derivative of sums and products. The chain rule. ~~The~~ Derivative of the inverse function. Rolle's theorem; the mean value theorem. One-dimensional version of the inverse function theorem. Taylor theorem for \mathbb{R} to \mathbb{R} ;

Lagrange's form of the remainder. Complex differentiation
Power Series

Complex power series and radius ~~and~~ of convergence. Exponential, trigonometric and hyperbolic functions and relations between them.

"Direct proof of differentiability of a power series within its circle of convergence"

Integration

Definition and basic properties of the Riemann integral. A non-integrable function, integrability of monotone functions. Integrability of piecewise-continuous functions. The fundamental theorem of calculus. Differentiation of indefinite integrals. Integration by parts. The integral form of the remainder in Taylor theorem. Improper integrals.

Appropriate Books

T.M. Apostol Calculus, vol 1 Wiley 1967-69

J.C. Burkill A First Course in Mathematical Analysis CUP 1978

D.J.H. Garling A Course in Mathematical Analysis (Vol 1) CUP 2013

J.B. Reade Introduction to mathematical Analysis (CUP)

M. Spivak Calculus Addison-Wesley (Pearson)

David M. Bressoud A Radical Approach to Real Analysis MAA Textbooks