

TENTATIVE OUTLINE

(1) **Preliminaries**

Naive set theory
Relations and functions
Countable and uncountable sets
Properties of the absolute value
Completeness of \mathbb{R}
Nested interval property and uncountability

(2) **Sequences and Series in \mathbb{R}**

Sequences and limits
Monotone sequences
Cauchy sequences
Limit superior and the limit inferior
Bolzano-Weierstrass theorem
Infinite series
Rearrangement of series

(3) **Continuous Functions on Intervals**

Functions and Limits
Continuity
Extreme Value Theorem
Intermediate Value Theorem

(4) **Metric Spaces**

Definition of metric spaces
Continuity in metric spaces
Sequences in metric spaces
Cauchy sequences and completeness
Compactness, uniform continuity, and the extreme value theorem
Connectedness and the intermediate value theorem
Function spaces

(5) **Differentiation**

Differentiable functions
Rolle's theorem and the mean value theorem
Taylor's Theorem and remainders

(6) **Riemann and Riemann-Stieltjes Integration**

Riemann integration and Riemann-Stieltjes integration
Classes of integrable functions
Fundamental theorem of calculus
Integration by parts and integration by substitution