Chapter 1

Logic and Proof

1.1 Logical Connectives

statement
sentential connectives
negation
conjunction
disjunction
implication
conditional statement
antecedent
consequent
equivalence
tautology

1.2 Quantifiers

universal quantifier
existential quantifier

1.3 Techniques of Proof: I

inductive reasoning
counterexample
deductive reasoning
hypothesis
conclusion
contrapositive
1.4 Techniques of Proof: II
Chapter 2

Sets and Functions

2.1 Basic Set Operations

elements or members of a set
subset
proper subset
equal
closed interval
open interval
half-open interval or half-closed interval
empty set
union
intersection
complement
universal set
disjoint
pairwise disjoint
Venn diagrams
indexed family of sets

2.2 Relations

(a, b)
Cartesian product or cross product
relation
related
equivalence relation
equivalence class
partition
CHAPTER 2. SETS AND FUNCTIONS

2.3 Functions

function
domain
range
codomain
function from $A$ to $B$
surjective or onto
injective or one-to-one
bijective
characteristic function or indicator function
image
pre-image or inverse image
composition
inverse function
identity function

2.4 Cardinality

equinumerous
finite set
infinite set
transfinite
denumerable
countable
uncountable
power set
continuum hypothesis
algebraic number
transcendental number
Chapter 3

The Real Numbers

3.1 Natural Numbers and Induction

natural numbers
prime
basis for induction
induction step
induction hypothesis
recursion relation

3.2 Ordered Fields

commutative ring
field
commutative laws
associative laws
distributive law
ordered field
absolute value
triangle inequality

3.3 The completeness Axiom and Sup and Inf

irrational numbers
upper bound of a set
lower bound of a set
bounded set
least upper bound
3.4 Topology of the Reals

neighborhood or $\epsilon$-neighborhood
radius
point set topology
deleted neighborhood
interior point
boundary point
closed set
open set
accumulation point
isolated point
closure of a set

3.5 Compact Sets

compact set
open cover
subcover
Chapter 4

Sequences

4.1 Convergence

sequence
converge
limit
diverge
bounded sequence

4.2 Limit Theorems

diverge to $+\infty$
diverge to $-\infty$

4.3 Monotone Sequences and Cauchy Sequences

increasing sequence
decreasing sequence
non-decreasing sequence
non-increasing sequence
monotone sequence
Cauchy sequence

4.4 Subsequences

subsequence
subsequential limit
limit superior or upper limit
limit inferior or lower limit
oscillating sequence
Chapter 5

Limits and Continuity

5.1 Limits of Functions

limit of $f$ at $c$
If $f : D \rightarrow \mathbb{R}$ and $g : D \rightarrow \mathbb{R}$, we define the sum $f + g$, the product $fg$, and the quotient $\frac{f}{g}$. Also if $k \in \mathbb{R}$, we define the multiple $kf$
right-hand limit
left-hand limit

5.2 Continuous Functions

continuous function at a point
continuous function on a set $S$
continuous function

5.3 Properties of Continuous Functions

bounded function

5.4 Uniform Continuity

uniformly continuous
extension of a function
Chapter 6

Differentiation

6.1 The Derivative

differentiable at a point, or has a derivative at a point

6.2 The Mean Value Theorem

strictly increasing function on an interval
strictly decreasing function on an interval

6.3 L’Hospital’s Rule

$f$ tends to $\infty$

6.4 Taylor’s Theorem

second derivative at a point
twice differentiable at a point
Taylor polynomials
Taylor series
Chapter 7

Integration

7.1 The Riemann Integral

partition of an interval
refinement of a partition
upper sum
lower sum
upper integral
lower integral
Riemann integrable on a closed interval
Riemann integral
integrable on a closed interval
integral

7.2 Properties of the Riemann Integral

monotone function

7.3 The Fundamental Theorems of Calculus

proper integral
improper integral
converge
diverge
Chapter 8

Infinite Series

8.1 Convergence of Infinite Series

- partial sums
- infinite series
- convergent series
- sum
- divergent series
- diverges to \(+\infty\)
- harmonic series

8.2 Convergence Tests

- converge absolutely or absolutely convergent
- converge conditionally or conditionally convergent

8.3 Power Series

- power series
- nth coefficient of the series
- radius of convergence
- interval of convergence
Chapter 9

Sequences and Series of Functions

9.1  Pointwise and Uniform Convergence

converges pointwise
converges uniformly

9.2  Applications of Uniform Convergence

9.3  Uniform Convergence of Power Series

represents