

NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Mathematics - NOC:Real Analysis - I

Subject Co-ordinator - Prof. Jaikrishnan J

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - WEEK 1 - INTRODUCTION
Lecture 2 - Why study Real Analysis
Lecture 3 - Square root of 2
Lecture 4 - Wason's selection task
Lecture 5 - Zeno's Paradox
Lecture 6 - Basic set theory
Lecture 7 - Basic logic
Lecture 8 - Quantifiers
Lecture 9 - Proofs
Lecture 10 - Functions and relations
Lecture 11 - Axioms of Set Theory
Lecture 12 - Equivalence relations
Lecture 13 - What are the rationals
Lecture 14 - Cardinality
Lecture 15 - WEEK 2 - INTRODUCTION
Lecture 16 - Field axioms
Lecture 17 - Order axioms
Lecture 18 - Absolute value
Lecture 19 - The completeness axiom
Lecture 20 - Nested intervals property
Lecture 21 - NIP+APâ Completeness
Lecture 22 - Existence of square roots
Lecture 23 - Uncountability of the real numbers
Lecture 24 - Density of rationals and irrationals
Lecture 25 - WEEK 3 - INTRODUCTION
Lecture 26 - Motivation for infinite sums
Lecture 27 - Definition of sequence and examples
Lecture 28 - Definition of convergence
Lecture 29 - Uniqueness of limits

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Lecture 30 - Achilles and the tortoise
Lecture 31 - Deep dive into the definition of convergence
Lecture 32 - A descriptive language for convergence
Lecture 33 - Limit laws
Lecture 34 - Subsequences
Lecture 35 - Examples of convergent and divergent sequences
Lecture 36 - Some special sequences-CORRECT
Lecture 37 - Monotone sequences
Lecture 38 - Bolzano-Weierstrass theorem
Lecture 39 - The Cauchy Criterion
Lecture 40 - MCT implies completeness
Lecture 41 - Definition and examples of infinite series
Lecture 42 - Cauchy tests-Corrected
Lecture 43 - Tests for convergence
Lecture 44 - Erdos's proof on divergence of reciprocals of primes
Lecture 45 - Resolving Zeno's paradox
Lecture 46 - Absolute and conditional convergence
Lecture 47 - Absolute convergence continued
Lecture 48 - The number e
Lecture 49 - Grouping terms of an infinite series
Lecture 50 - The Cauchy product
Lecture 51 - WEEK 5 - INTRODUCTION
Lecture 52 - The role of topology in real analysis
Lecture 53 - Open and closed sets
Lecture 54 - Basic properties of adherent and limit points
Lecture 55 - Basic properties of open and closed sets
Lecture 56 - Definition of continuity
Lecture 57 - Deep dive into epsilon-delta
Lecture 58 - Negating continuity
Lecture 59 - The functions x and x^2
Lecture 60 - Limit laws
Lecture 61 - Limit of $\sin x$
Lecture 62 - Relationship between limits and continuity
Lecture 63 - Global continuity and open sets
Lecture 64 - Continuity of square root
Lecture 65 - Operations on continuous functions
Lecture 66 - Language for limits
Lecture 67 - Infinite limits
Lecture 68 - One sided limits

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Lecture 69 - Limits of polynomials
Lecture 70 - Compactness
Lecture 71 - The Heine-Borel theorem
Lecture 72 - Open covers and compactness
Lecture 73 - Equivalent notions of compactness
Lecture 74 - The extreme value theorem
Lecture 75 - Uniform continuity
Lecture 76 - Connectedness
Lecture 77 - Intermediate Value Theorem
Lecture 78 - Darboux continuity and monotone functions
Lecture 79 - Perfect sets and the Cantor set
Lecture 80 - The structure of open sets
Lecture 81 - The Baire Category theorem
Lecture 82 - Discontinuities
Lecture 83 - Classification of discontinuities and monotone functions
Lecture 84 - Structure of set of discontinuities
Lecture 85 - WEEK 8 and 9 - INTRODUCTION
Lecture 86 - Definition and interpretation of the derivative
Lecture 87 - Basic properties of the derivative
Lecture 88 - Examples of differentiation
Lecture 89 - Darboux's theorem
Lecture 90 - The mean value theorem
Lecture 91 - Applications of the mean value theorem
Lecture 92 - Taylor's theorem NEW
Lecture 93 - The ratio mean value theorem and L'Hospital's rule
Lecture 94 - Axiomatic characterisation of area and the Riemann integral
Lecture 95 - Proof of axiomatic characterization
Lecture 96 - The definition of the Riemann integral
Lecture 97 - Criteria for Riemann integrability
Lecture 98 - Linearity of integral
Lecture 99 - Sets of measure zero
Lecture 100 - The Riemann-Lebesgue theorem
Lecture 101 - Consequences of the Riemann-Lebesgue theorem
Lecture 102 - WEEK 10 and 11 - INTRODUCTION
Lecture 103 - The fundamental theorem of calculus
Lecture 104 - Taylor's theorem-Integral form of remainder
Lecture 105 - Notation for Taylor polynomials
Lecture 106 - Smooth functions and Taylor series
Lecture 107 - Power series

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- Lecture 108 - Definition of uniform convergence
- Lecture 109 - The exponential function
- Lecture 110 - The inverse function theorem
- Lecture 111 - The Logarithm
- Lecture 112 - Trigonometric functions
- Lecture 113 - The number Pi
- Lecture 114 - The graphs of sin and cos
- Lecture 115 - The Basel problem
- Lecture 116 - Improper integrals
- Lecture 117 - The Integral test
- Lecture 118 - Weierstrass approximation theorem
- Lecture 119 - Bernstein Polynomials
- Lecture 120 - Properties of Bernstein polynomials
- Lecture 121 - Proof of Weierstrass approximation theorem