

Theory for oral exam

1. Basic topology and continuity

2.12 Countable union of countable sets is countable

2.14 The set of binary sequences is not countable

2.40 k -cells are compact.

2.41 In \mathbb{R}^k a set E is closed and bounded $\Leftrightarrow E$ is compact \Leftrightarrow Every infinite subset of E has a limit point in E .

3.7 Set of subsequential limits is closed.

3.11 Cauchy sequences and convergence

3.33 Root test & 3.39 Power series

3.34 Ratio test

4.8 Continuity: Inverse image of open sets are open.

4.14 Images of compact sets are compact

4.22 Images of connected sets are connected

4.30 Monotone function has countable set of discontinuities

2. Interchange of limit processes

6.8 Continuity implies integrability

6.10 Disjoint points of discontinuity implies integrability

6.12 Linearity of integrals

7.11 Uniform convergence implies $\lim_{t \rightarrow x} \lim_{n \rightarrow \infty} f_n(t) = \lim_{n \rightarrow \infty} \lim_{t \rightarrow x} f_n(t)$

7.15 $C(X)$ is complete

7.16 Integration of uniformly convergent sequence.

7.17 Derivation of uniformly convergent sequence

*7.26 The Stone-Weierstrass theorem

3. Functions of several variables

9.7 Inequalities for $\|A\|$

9.8 Properties of $GL_n(\mathbb{R})$.

9.11 Definition of differentiability

9.15 Chain rule

9.19 Estimation of difference of function values

9.23 Fixed point theorem

*9.24 Inverse function theorem

*9.28 Implicit function theorem

For those topics marked with *, only the statement of the respective results and their possible applications could be evaluated.