KAJIAN-KAJIAN TUGAS AKHIR PADA ANALISIS REAL DAN TOPOLOGI

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Analisis Real

Merupakan cabang dari Analisis Matematik (Analisis) pada R.

Teori dari bilangan dan fungsi-fungsi bernilai Real

Pembahasan:
- sifat-sifat analitik dari fungsi dan barisan real;
- sifat-sifat kekonvergenan dan limit dari barisan bilangan dan fungsi real;
- kekontinuan dan smoothness, turunan dan integral dari fungsi-fungsi bernilai real.

Analisis Matematik:
-Analisi Real
-Analisis Fungsional
-Analisis Harmonik
-Analisis Kompleks
-Geometri Diferensial
-Analisis Numerik

Cakupan Materi:

-Barisan bilangan dan limitnya
-Limit Fungsi
-Kekontinuan
-Integral Riemann
-Barisan dan deret fungsi
-Topologi pada R
-Integral Perluasan Riemann
-Integral jenis lain

Pengantar Analisis Real: Topik-topik di atas dibahas pada R.
Analisis Real Lanjut: Pembahasan pada Rn

Topologi

Topology, as a branch of mathematics, can be formally defined as "the study of qualitative properties of certain objects (called topological spaces) that are invariant under certain kind of transformations (called continuous maps), especially those properties that are invariant under a certain kind of equivalence (called homeomorphism)."

The term *topology* is also used to refer to a structure imposed upon a set *X*, a structure which essentially 'characterizes' the set *X* as a topological space by taking proper care of properties such as convergence, connectedness and continuity, upon transformation

Topologi: Konsep Esensial

- Every closed interval in **R** of finite length is compact. More is true: In $\mathbf{R}^n$, a set is compact if and only if it is closed and bounded. (See Heine-Borel theorem).
- Every continuous image of a compact space is compact.
- Tychonoff's theorem: The (arbitrary) product of compact spaces is compact.
- A compact subspace of a Hausdorff space is closed.
- Every continuous bijection from a compact space to a Hausdorff space is necessarily a homeomorphism.
- Every sequence of points in a compact metric space has a convergent subsequence.
- Every interval in **R** is connected.
- Every compact m-manifold can be embedded in some Euclidean space $\mathbf{R}^n$.
- The continuous image of a connected space is connected.
- A metric space is Hausdorff, also normal and paracompact.

Kajian untuk Tugas Akhir

- Topik-topik analisi real pada Rn.
- Integral lipat 2 (kalkulus lebih formal)
- Integral lipat 3 (kalkulus lebih formal)
- Integral Lebesque
- Integral jenis lain: Mc Shine
- Persamaan integral: ruang $L^2\{0,1\}$
- Topologi dari ruang fungsi-fungsi kontinu
- Fungs-fungsi Bervariasi Terbatas
- Topologi dari ruang fungsi-fungsi bervariasi terbatas.
- Persamaan differensial dan sistem dinamik

Ruang $L^2([0,1])$

adalah ruang dari fungsi-fungsi terintegralkan pada [0,1] dan memenuhi

$$\int_0^1 |f(x)|^2 dx < \infty.$$

Didefinisikan dot product

$$< f, g > = \int_0^1 f(x)\, g(x)\, dx$$

dan

$$|f|^2 = \int_0^1 |f(x)|^2 dx.$$

- Masalah:
  - Konsep-konsep dasar yang dimiliki ruang tersebut.
  - Kekonvergenan barisan pada ruang tersebut
  - Konsep-konsep lain yang dipertahankan oleh suatu fungsi yang terintegralkan.