

Calculus 1 2022-2023.
Program
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- The abbreviation **(P)** near the number of a Theorem (or Proposition, Lemma, Corollary*) means that the student must know the proof of it. The numbers refers to the last version of the uploaded typed notes. The knowledge of all other proofs is optional.
- **All** definitions and the statements of all theorems (as well as propositions, lemmas, corollaries) listed below, together with fundamental examples, have to be known by the student.

Chapter 1: Basics.

All subjects

Chapter 2: Real numbers.

All subjects (except *cardinality* which was announced in the typed notes but not eventually treated). Theorem 2.1.1 (Irrationality of $\sqrt{2}$) **(P)**

Chapter 3: Complex numbers.

All subjects.

Chapter 4: Sequences.

All subjects except paragraph 4.7 (mathematical modelling).

Proposition 4.2.1 (Uniqueness of the limit)**(P)** (Only the proof of the case when the limit is finite. The proof of the case of an infinite limit is optional). Theorem 4.2.4("Two policemen theorem") **(P)**.

Chapter 5: Limit.

All subjects. Proposition 5.6.4 (I.S.P.)**(P)**

Chapter 6: Continuity.

All subjects. Theorem 6.4.3 (Weierstrass)**(P)**

Chapter 7: Differential Calculus.

All subjects except Paragraph 7.10 and 7.13 Proposition 7.2.4(*Differentiability implies continuity*) **(P)**, Theorem 7.4.2 (*Chain rule*) **(P)**, Theorem 7.5.2 (*Fermat*) **(P)**, Theorem 7.5.4 (*Rolle*) **(P)**, Theorem 7.5.5 (*Lagrange*) **(P)**, Theorem 7.6.1 (*Monotonicity and derivative's sign*) **(P)**

Chapter 8: Integral Calculus.

All subjects. Proposition 8.2.5 (*Integral mean*) (**P**), Theorem 8.3.2 (*The integral function $x \rightarrow F_c(x) := \int_c^x f(t)dt$ is a primitive of f*) (**P**), Corollary 8.3.3 (*Fundamental formula of integration*) (**P**)

Chapter 9: Numerical series.

All subjects. Proposition 9.2.6 (*If the series converges then the sequence tends to 0*) (**P**), Theorem 9.3.2 (*Comparison*) (**P**), Theorem 9.4.4 (*Absolute convergence implies convergence*) (**P**)