

Oral continuation exam for MAT2410 autumn semester 2023.

The examination will last for approximately 30 min. No aids will be permitted (no textbook, no personal notes). There will be a blackboard available. The exam will consist of three parts:

5 minutes. Present any topic you want from the curriculum (orally, using also the blackboard). It could typically be a theorem including its proof or a computation technique including a justification and an example.

10 minutes. Present one of the following topics (orally, using also the blackboard), to be decided by throwing a dice on the day of the examination. There will be some time to collect thoughts before the mini-presentation once the topic is known.

1. *Basics about complex numbers and analytic functions.* Polar representation. Leibniz rule. Chain rule.
2. *Differentials and line integrals.* Closedness and exactness. Path independence.
3. *Differentials of the form $f(z)dz$.* ML estimate. Cauchy's theorem.
4. *Power series.* Radius of convergence. Relation to analytic functions. Isolated zeroes.
5. *Laurent series.* Isolated singularities. Meromorphic functions.
6. *Residue calculus.* Counting zeroes and poles. Rouché.

15 minutes. Questions on the above topics. An exercise or two concerning the curriculum.

Compiled January 17, 2024.