

Functions of Complex variable, 2.

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Course description:

This is a semester course for toar rishon. I assume that students know basics of complex analysis but will remind basic facts in my first lecture.

Books. In my exposition I mostly follow the book: S. Lang, Complex Analysis, Springer. However I am also planning to add a lot of additional material.

Home assignments. I will be giving problem assignments weekly. These problem assignments are the integral part of the course - they will contain many important points for which there is not enough time in the course itself.

The grades for home assignments will be a factor in the final grade for the course.

Exams. There will be a midterm exam in class and a final take home exam.

Syllabus.

1. Generalities on holomorphic functions.
2. Principle of analytic continuation. Examples of definitions based on analytic continuation.
3. Holomorphic and meromorphic functions.
4. Weierstrass product expansion.
5. Functions of finite growth. Hadamard factorization theorem.
6. Harmonic functions.

Growth estimates for holomorphic functions.

7. Jensen's formula.
8. Phragmen - Lindelöf principle and Hadamard Theorems.

Special functions.

9. Gamma functions (Gauss formula, product expansion, Stirling formula).
10. Weierstrass P-function. Elliptic functions.
11. Theta functions, modular forms, Jacobi identity.
12. Riemann zeta function and prime numbers theorem.

Geometric theory of holomorphic functions.

13. Conformal mappings, Schwarz reflection, excercises.
14. Riemann mapping theorem, continuity at the boundary.
15. Riemann surfaces
16. Picard theorem
17. Hartog's theorem