106929 Selected Topics in Analysis 2

Instructor: Prof. Igal Sason (office: Meyer 652, e-mail: sason@ee.technion.ac.il).

Place and time: Spring 2022, hours and room will be announced.

Pre-requisites: Elementary courses in calculus, linear algebra, and probability theory.

Grading: The grade will rely on a final work at home.

Course outline (tentative):

1. Part 1: Selected topics in analysis.
   - Introduction: Some nice applications of basic inequalities.
   - Proof of Stirling and Wallis formulas, and nice applications.
   - An integral representation of the logarithm, generalizations, and applications.
   - A theorem of Polya on polynomials.
   - Permanent of matrices, and a (nice) proof of Van der Waerden’s conjecture.
   - Hilbert’s and Hardy’s inequalities with applications.
   - Elements of majorization theory and Schur convexity with applications.

2. Part 2: Selected topics in analytical number theory.
   - On the infinity of primes.
   - Bertrand’s postulate.
   - Binomial coefficients are almost never powers.
   - Arithmetic functions and Dirichlet multiplication.
   - Euler’s constant, harmonic and prime-harmonic sums, integral representations.
   - The divisor and sum-of-divisors functions.
   - On the distribution of prime numbers, including the prime number theorem.

References


