

Elementary Number Theory, E2009

The object of Elementary Number Theory is our usual natural numbers, with a special emphasis on some of the exciting properties of prime numbers. The course is elementary in the sense that it does not develop a theoretical foundation: the results are obtained using tools that are either well known or developed during the course with a specific result in mind. On the other hand, the well known tools include those from an introductory course in Abstract Algebra (as Algebra 1 and, preferably Algebra 2), containing abstract groups, rings, and fields. On this foundation, some arguments used in the course are not trivial. A knowledge of complex analysis is not required, but part of the course may be more amusing if a considerable number of participants are familiar with, say, the residue formula, as found in the course KomAn.

The teaching language (for the lectures and the lecture notes) is Danish. In translation, the contents of the notes are the following:

1. Prime Numbers.
2. The groups of invertible residue classes.
3. Cyclotomic polynomials. Finite fields.
4. The law of quadratic reciprocity.
5. Primality tests.
6. RSA, and other public key systems.
7. Pollard's rho method.
8. About the Möbius function.
9. The functional equation for the Riemann zeta-function.
10. Some Diophantine equations.

Elementary Number Theory is a Block 2B course, running with lectures and group activities under supervision over 9 weeks. Ordinary assessment: Internal tests during the course.

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