

Analytic Number Theory (M24)

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In this course we will cover results on the distribution of prime numbers, in particular the celebrated prime number theorem. This is done by studying analytic properties of the Riemann zeta function and connections between the location of its zeros and results on prime numbers. We will also cover results from the theory of multiplicative functions, such as mean value results for these. This is a topic that has seen a lot of recent activity.

Topics likely to be covered include:

- Arithmetic functions
- Properties of the Riemann zeta function
- The prime number theorem
- The Riemann hypothesis and its connections with the distribution of primes
- Mean values of multiplicative functions

Prerequisites

Elementary number theory (as covered in Part II *Number Theory*), Basic complex analysis (as covered in Part IB *Complex Analysis*).

Literature

1. T. Apostol, *Introduction to Analytic Number Theory*, Springer, 1976.
2. M. Ram Murty, *Problems in analytic number theory*, Springer, 2008.
3. H. Davenport, *Multiplicative number theory*, Springer, 2000.
4. H.L. Montgomery, R.C. Vaughan, *Multiplicative number theory. I. Classical theory*, CUP, 2007.

Additional support

Four examples sheets will be provided and four associated examples classes will be given. There will be a revision class in the Easter Term.