Analytic, topological and probabilistic approaches to primality matters

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We will survey some topics related to the amount of prime numbers and approaches to this kind of question using analytic and topological ideas. For example, one can prove that there are infinitely many primes using analytic tools (the zeta function) or topology (taking the profinite completion of the integers). Similarly, one can look for a topological version of Dirichlet's theorem that there are infinitely many primes in arithmetic progressions. The topological approach also suggests some new definitions for probabilistic number theory.

The talk should be largely elementary and accessible to undergraduates.