

Studies on zeta functions: inequalities, limit theorems and problems

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This talk surveys recent results obtained by the speaker in analytic and computational number theory. Particular attention is given to inequalities concerning absolute values of zeta functions at places symmetric with respect to the critical line, including the Riemann zeta function, Dirichlet L -functions, the modified Selberg zeta function, and the Selberg zeta function associated with compact Riemann surfaces. These inequalities are of special interest because of their close connections with the Riemann Hypothesis and its generalizations. Further results address the prime zeta function, one of the most under-researched members of the family. New results on its zero-free region are presented, together with conjectures on the distribution of its zeros. In addition, limit theorems for combinatorial numbers associated with zeta functions are examined, along with applications of these asymptotic results to the development of efficient algorithms for the numerical evaluation of zeta function values.