

Equality of Dedekind sums: experimental data, and theory

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We consider the question of equality of the classical Dedekind sums, namely when is $s(a, b) = s(c, b)$? Here $\gcd(a, b) = 1$ and $\gcd(a, c) = 1$, where a, b, c are integers. The classical Dedekind sum may be easily be defined by $\sum_{n=1}^b (\{n/b\} - 1/2)(\{na/b\} - 1/2)$, where $\{x\}$ is the fractional part of x .

Although this easy-to-understand question looks simple, it is an open problem for some time. Partial results are now known, over the last 4 years, for example when b is a prime or a power of a prime. But even in the case that b is a product of 2 or 3 primes, it is an open problem. Dedekind sums appear in the combinatorial geometry of integer points enumeration in polytopes, singularity theory in topology, knots, modular forms, and spatial statistics. This work began with Jabuka and Xinli.