# Integer linear programming via analytic number theory

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We approach a basic question in integer linear prgoramming, namely the probelm of *finding* an integer point (or all of them) inside a polytope, given its facet description. We first develop new types of differentiable Dedekind sums, and reciprocity laws for them in all dimensions, and then use them to 'zero in' on the location of integer points inside rational polytopes. This is work in progress, and the methods will be illustrated with certain instructive rational polygons and rational polytopes.

Our approach presents an alternative approach to Barvinok's algorithm, using some new analytic functions that we call differentiable Dedekind sums. This work is joint with Helaman Ferguson.