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Exact Linear and Integer Programming

Resources for the tutorial may be found at
`www.oakland.edu/~steffy/issac.html`.

Summary:
Linear and integer programming provide powerful and flexible tools for modeling and solving a variety of decision problems. Although most optimization software used today is based on inexact floating-point arithmetic, a number of recent efforts have focused on developing efficient techniques to compute exact solutions and safe bounds.

The first component of this tutorial will be a self contained introduction to the state-of-the-art in computational linear and integer programming. We will describe general-purpose algorithms such as the simplex method, branch-and-bound and the cutting-plane method. We will also discuss how these algorithms can often be extended into highly efficient problem-specific methods. The second component of this tutorial will focus on recent progress with computing exact solutions. This will include hybrid symbolic-numeric algorithms for finding exact solutions to problem instances defined with rational data, the use of directed rounding to compute valid cutting planes, and the use of interval methods to compute valid bounds. We will highlight some of the many open questions and potential areas for further progress.