

Integral Farkas type Lemmas for systems with equalities and inequalities

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A central result in the theory of integer optimization states that a system of linear diophantine equations $Ax = b$ has no integral solution if and only if there exists a vector in the dual lattice, $y^T A$ integral such that $y^T b$ is fractional. We extend this result to systems that both have equations and inequalities $\{Ax = b, Cx \leq d\}$. We show that a certificate of integral infeasibility is a linear system with $\text{rank}(C)$ variables containing no integral point. The result also extends to the mixed integer setting.

Joint work with K. Andersen (Copenhagen) and R. Weismantel (Magdeburg)