1124-52-224 **Gabor Pataki*** (gabor@unc.edu), Department of Statistics, and Operations Research, Chapel Hill, NC 27599, and **Minghui Liu**. *An elementary certificate of infeasibility in semidefinite programming.*

Proving infeasibility is a central problem in optimization and it is a straightforward task in linear programming, using the well known Farkas' lemma. In contrast, in semidefinite programming (SDP) the known infeasibility certificates are either not exact (they do not certify infeasibility of all infeasible SDPs), or are fairly complex.

In this work we obtain a short certificate of infeasibility in SDP by simply reformulating equality constrained semidefinite systems using elementary row operations, and rotations. When a system is infeasible, the reformulated system is trivially infeasible.

Our reformulation is an analogue of the row echelon form of a linear system of equations.

As a corollary, we obtain algorithms to generate the data of all infeasible SDPs; and the data of all feasible SDPs whose maximum rank feasible solution has a prescribed rank.

In somewhat different language, our reformulations provide a standard form of spectrahedra, to easily verify either their emptiness, or a tight upper bound on the rank of feasible solutions. (Received September 09, 2016)