1068-90-149   **Gabor Pataki*** (`gabor@unc.edu`), Dept of Statistics and Operations Research, Hanes Hall 307, UNC Chapel Hill, Chapel Hill, NC 27516. *Bad semidefinite programs: they all look the same.*

A dual solution serves as a certificate of optimality in semidefinite programming, so it is important to understand when such certificates are not available. We say that the semidefinite system (spectrahedron) P is *badly behaved*, if for some linear objective function "c" the value $\sup \{ cx : x \in P \}$ is finite, but the dual program has no solution attaining the same value.

We give simple, and exact characterizations of badly behaved semidefinite systems. Surprisingly, it turns out that a certain system with one variable, and two by two matrices appears as a minor in all badly behaved systems in a well-defined sense. The main tool we use is one of our recent results, that characterizes when the linear image of a closed convex cone is closed.

We give similar characterizations of badly behaved second order conic systems. While we use convex analysis, the characterizations have a combinatorial flavor. (Received January 17, 2011)