1056-15-355 **Emily McHenry*** (mchenrye@xavier.edu) and **Robert Lang** (rlang6@fau.edu). *Inverse Inertia Problem for Graphs.*

Let $G$ be an undirected graph on $n$ vertices and let $S(G)$ be the set of all real symmetric $n \times n$ matrices whose nonzero off-diagonal entries occur in exactly the positions corresponding to the edges of $G$. The minimum rank problem for $G$ is to determine the smallest possible rank, $\mathrm{mr}(G)$, of a matrix in $S(G)$. It has been an active area of research for a decade. The inverse inertia problem for a graph, a refinement of the minimum rank problem, asks which inertias can be attained by a matrix in $S(G)$.

The inverse inertia problem has been completely solved for trees in a paper by Barrett, Hall, and Loewy. We develop a number of new techniques in order to be able to determine possible inertias of general graphs: covers with cliques, covers with cliques and clique-stars, and the graph operations of edge subdivision, edge deletion, joins, and unions. Our results are strong enough to determine the inertia set of each graph on 6 or fewer vertices and can be applied to many graphs with larger order as well. (Received September 01, 2009)