1077-15-2757 **Wayne Barrett*** (`wayne@math.byu.edu`), Department of Mathematics, Brigham Young University, Provo, UT 84602. *The Inverse Inertia Problem for Graphs.*

Let G be a 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 inverse eigenvalue problem for G is:

(IEPG) Given a graph G on n vertices and real numbers $\lambda_1, \lambda_2, \ldots, \lambda_n$, is there a matrix in $S(G)$ with eigenvalues equal to $\lambda_1, \lambda_2, \ldots, \lambda_n$?

The major progress on the (IEPG) has been made for trees; it is an open problem for most other graphs.

A simplification of the (IEPG) is the inverse inertia problem. The *partial inertia* of a real symmetric matrix A is the pair $(\pi(A), \nu(A))$, where $\pi(A)$ is the number of positive eigenvalues of A, and $\nu(A)$ is the number of negative eigenvalues. The inertia set of a graph G is the set of all partial inertias of matrices in $S(G)$.

We give an overview of a number of techniques that have been used for determining the inertia sets of graphs including clique and star covers, the graph operations of edges subdivision/deletion and joins, separating sets, and Colin de Verdière parameters. These suffice to determine the inertia sets of the 1,252 graphs on 7 or fewer vertices. (Received September 22, 2011)