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EXTREME SPECTRA REALIZATION BY REAL SYMMETRIC TRIDIAGONAL AND REAL SYMMETRIC ARROW MATRICES*

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Abstract. We consider the following two problems: to construct a real symmetric arrow matrix A and to construct a real symmetric tridiagonal matrix A, from a special kind of spectral information: one eigenvalue $\lambda^{(j)}$ of the $j \times j$ leading principal submatrix A_j of A, $j = 1, 2, \ldots, n$; and one eigenpair $(\lambda^{(n)}, \mathbf{x})$ of A. Here we give a solution to the first problem, introduced in [J. Peng, X.Y. Hu, and L. Zhang. Two inverse eigenvalue problems for a special kind of matrices. Linear Algebra Appl., 416:336-347, 2006.]. In particular, for both problems to have a solution, we give a necessary and sufficient condition in the first case, and a sufficient condition in the second one. In both cases, we also give sufficient conditions in order that the constructed matrices be nonnegative. Our results are constructive and they generate algorithmic procedures to construct such matrices.

 ${\bf Key}$ words. Real symmetric tridiagonal matrices, Real symmetric arrow matrices, Eigenproblem.

AMS subject classifications. 65F15, 65F18, 15A18.

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