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Reshmi Nair* (rnair@uwyo.edu) and **Bryan Shader** (BShader@uwyo.edu). *Acyclic matrices with a small number of distinct eigenvalues.*

We continue the study of the spectral properties of $\mathcal{S}(\mathcal{T})$, the set of all n by n symmetric matrices for a tree \mathcal{T} on n vertices where $a_{ij} \neq 0$ for $i \neq j$ if and only if $i-j$ is an edge in \mathcal{T} . For a given list of integers m_1, m_2, \dots, m_k , we study the problem of characterizing the trees \mathcal{T} for which there is an $A \in \mathcal{S}(\mathcal{T})$ whose eigenvalues have multiplicities m_1, m_2, \dots, m_k . An approach based on Smith Normal Form, Hamming distance, and Parter and Fiedler vertices is used to characterize the acyclic matrices that have atmost 5 distinct eigenvalues. (Received January 29, 2010)