1135-15-200 **Wei Gao*** (wzg0021@auburn.edu), Parker Hall 221, Department of Mathematics and Statistics, Auburn University, Auburn, AL 36830, and **Zhongshan Li** and **Lihua Zhang**. *Tree Sign Patterns that Require $\mathbb{H}_n$.*

A sign pattern (matrix) $\mathcal{A}$ is a matrix whose entries are from the set $\{+, -, 0\}$. The qualitative class of $\mathcal{A}$, denoted $Q(\mathcal{A})$, is defined as $Q(\mathcal{A}) = \{B \in M_n(\mathbb{R}) \mid \mathrm{sgn}(B) = \mathcal{A}\}$. The refined inertia of a square real matrix B, denoted $\mathrm{ri}(B)$, is the ordered 4-tuple $(n_+(B),\ n_-(B),\ n_z(B),\ 2n_p(B))$, where $n_+(B)$ (resp., $n_-(B)$) is the number of eigenvalues of B with positive (resp., negative) real part, $n_z(B)$ is the number of zero eigenvalues of B, and $2n_p(B)$ is the number of pure imaginary eigenvalues of B. The set of refined inertias $\mathbb{H}_n = \{(0, n, 0, 0), (0, n-2, 0, 2), (2, n-2, 0, 0)\}$ is important for the onset of Hopf bifurcation in dynamical systems. An $n \times n$ sign pattern $\mathcal{A}$ is said to require $\mathbb{H}_n$ if $\mathbb{H}_n = \{\mathrm{ri}(B) | B \in Q(\mathcal{A})\}$. In this talk, we discuss the star and path sign patterns that require $\mathbb{H}_n$. It is shown that for each $n \geq 5$, a star sign pattern requires $\mathbb{H}_n$ if and only if it is equivalent to one of the five sign patterns identified in the talk. It is also shown that no path sign pattern of order $n \geq 5$ requires $\mathbb{H}_n$. (Received August 08, 2017)