

1086-VN-1034 **Jeremy L. Martin** and **Jennifer D. Wagner*** (jennifer.wagner1@washburn.edu), Washburn University, 1700 SW College Ave., Topeka, KS 66621. *On the spectra of simplicial rook graphs.*

The *simplicial rook graph* $SR(d, n)$ is the graph whose vertices are the lattice points in the n th dilate of the standard simplex in \mathbb{R}^d , with two vertices adjacent if they differ in exactly two coordinates. We prove that the adjacency and Laplacian matrices of $SR(3, n)$ have integral spectrum for every n . The proof proceeds by calculating an explicit eigenbasis. We conjecture that $SR(d, n)$ is integral for all d and n , and present evidence in support of this conjecture. For $n < \binom{d}{2}$, the evidence indicates that the smallest eigenvalue of the adjacency matrix is $-n$, and that the corresponding eigenspace has dimension given by the Mahonian numbers, which enumerate permutations by number of inversions. (Received September 18, 2012)