1117-05-379 **Joshua E Ducey*** (duceyje@jmu.edu), **Jonathan Gerhard** and **Noah Watson**. *The Smith and critical groups of the $n \times n$ Rook's graph and its complement.*

Let R_n denote the graph with vertex set consisting of the squares of an $n \times n$ grid, with two squares of the grid adjacent when they lie in the same row or column. This is the $n \times n$ Rook's graph, and can also be thought of as the Cartesian product of two complete graphs of order n, or the line graph of the complete bipartite graph $K_{n,n}$. In this talk we compute the Smith group and critical group of the graph R_n and its complement. This is equivalent to determining the Smith normal form of both the adjacency and Laplacian matrix of each of these graphs. In doing so we verify a 1986 conjecture of Rushanan. (Received January 18, 2016)