Thomas W Polaski* (polaskit@winthrop.edu), Department of Mathematics, Winthrop University, Rock Hill, SC 29733. Visualizing Discrete Dynamical Systems.

Discrete dynamical systems of the form $x_{k+1} = Ax_k$ are often encountered in the first undergraduate linear algebra course and are used in models from ecology and engineering. The eigenvalues and eigenvectors of $A$ are the key to understanding the long-term behavior of these systems. When $A$ is a $2 \times 2$ matrix, one can gain geometric information about the dynamical system by plotting a trajectory, which is an initial point $x_0$ together with its iterates $x_1, x_2, \ldots$. This talk will demonstrate programs in Mathematica that allow students to create a matrix $A$ with their choice of real or complex eigenvalues and to animate trajectories of the resulting dynamical system from multiple initial points. The programs also allow students to work with a matrix with randomly chosen eigenvectors so as to discover the importance of the directions of the eigenvectors when the eigenvalues of $A$ are real. (Received September 21, 2010)