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Megan Wawro* (mwawro@vt.edu), **Michelle Zandieh** and **David Plaxco**. *An instructional sequence for change of basis and eigentheory.*

We present an innovative instructional sequence for an introductory linear algebra course that supports students' reinvention of change of basis, eigentheory, and how they are related through diagonalization. Task 1 builds from students' experience with linear transformations in \mathbb{R}^2 to introduce them to the idea of stretch factors and stretch directions and how these create a non-standard coordinate system for \mathbb{R}^2 . Task 2 has students create matrices that convert between the standard and non-standard coordinate systems and relate these to the stretching transformation of Task 1 to reinvent the equation $PDP^{-1}x = Ax$. In Task 3, students build from their experience with stretch factors and directions to create for themselves ways to determine eigenvalues and eigenvectors given various information about a transformation. In Task 4, students work with examples in \mathbb{R}^3 to develop the characteristic equation as a solution technique, as well as connect ideas about eigentheory to their earlier work with change of basis through the idea of diagonalization. We will share information about our project website which contains instructor resources such as examples of student thinking, implementation notes, and homework suggestions for this task sequence. (Received September 13, 2014)