

1116-VI-1547

Geoffrey Buhl, Elijah Cronk, Rosa Moreno, Kirsten Morris, Dianne Pedroza and Jack Ryan* (jaryan@noctr1.edu), North Central College, 30 N. Brainard #1129, Naperville, IL 60540. *Matrix Completions for the Commutativity Equation.*

A matrix completion problem attempts to determine if a partial matrix composed of specified and unspecified entries can be completed to satisfy some given property. This project focuses on determining which patterns of specified and unspecified entries for a partial matrix can be completed to solve the commutativity matrix equation $AX - XA = 0$. The conditions under which two matrices commute are well known, but an open question is “can a partial matrix be completed to commute with a given matrix?” We approach this problem with two techniques: converting the matrix equation into a linear equation and examining bases for the solution space of the commutativity equation. We seek to determine whether a particular pattern can be written as a linear combination of the basis elements. If so, the pattern is admissible; otherwise, the pattern is inadmissible. This work classifies patterns as admissible or inadmissible based on the ability or inability of their corresponding partial matrices to be completed to satisfy the commutativity equation for almost any matrix A . Our results present a partial characterization of admissible and inadmissible patterns for the commutativity equation. (Received September 20, 2015)