1056-14-1419 **Matthew J. Menickelly*** (menickmj@muohio.edu), 1010 Arrowhead Dr., Oxford, OH 45056, and **Katharina M. Carella** (k.m.carella@gmail.com), 208 Pennsylvania Ave., Ithaca, NY 14850. *Sudoku, Shidoku, and . . . Gröbner Bases? An Algebraic and Computer Systems Approach to Counting Equivalent Puzzles.* Preliminary report.

Sudoku, and its smaller counterpart, Shidoku, have been studied to try to determine the conditions that lead to a unique completion of a given incomplete puzzle. In this talk, we consider instead the number of possible solution boards from incomplete puzzles. We present the algebraic group derived from symmetries of Shidoku boards. We then use this group to define equivalent puzzles in terms of the orbits of set elements under these group actions to classify all possible numbers of solutions from incomplete puzzles. We use Gröbner Basis representations of Shidoku and Sudoku to obtain these results. Ultimately, we provide a complete classification of all the possible number of solutions that can result from incomplete Shidoku puzzles. (Received September 21, 2009)