1086-N1-1163   **Megan Wawro*** (`mwawro@vt.edu`), 460 McBryde Hall (0123), Blacksburg, VA 24061. *Reasoning About Solutions in Linear Algebra: The Case of Abraham and the Invertible Matrix Theorem.*

This study analyzes how one student, Abraham, reasoned about solutions to $Ax = 0$ and $Ax = b$ (for matrices A and vectors x, b, and 0), and how he reasoned about solutions to justify how concept statements in the Invertible Matrix Theorem (IMT) are related. This case study, rather than focusing on student difficulties in undergraduate mathematics, serves as a compelling example of the productive and powerful reasoning that is possible as students make sense of complex mathematics. Data sources were video and transcript from whole class discussion, small group work, and individual interviews. The overarching analytical structure was influenced by genetic analysis (Saxe, 2002), and Toulmin's Model of Argumentation (1969) was employed to analyze the structure of arguments both in isolation (microgenesis) and over time (ontogenesis). Results focus on Abraham's reasoning about how solutions to $Ax = 0$ and $Ax = b$ are related, on his reasoning with solutions to justify claims about other concepts in the IMT, and on how his flexibility with using and interpreting various symbolic representations of the two matrix equations may have facilitated his success in reasoning about and reasoning with solutions. (Received September 19, 2012)