1056-G1-958 **Jeffrey L Stuart*** (jeffrey.stuart@plu.edu), Mathematics Department, Pacific Lutheran University, Tacoma, WA 98447. *Inverses for Matrices that Don't Have Inverses.*

Every student who takes linear algebra learns that the matrix A has an inverse B if and only if $AB = BA = I$, and that if you apply row operations to the augmented matrix $[A \mid I]$ to obtain $[rref(A) \mid M]$ where $rref(A)$ denotes the reduced row echelon form of A, then M is the inverse of A exactly when $rref(A) = I$. What happens when A does not have an inverse? This simple question provides a natural opportunity to introduce students to how mathematicians weaken requirements, posit generalizations and seek to preserve desirable properties. Along the way, students learn what M is trying to tell them. (Received September 18, 2009)