1023-Z1-126 **Raymond N Greenwell*** (`matrng@hofstra.edu`), Department of Mathematics, Hofstra University, Hempstead, NY 11549, and **Stanley Kertzner**. *A Method for Generating Integer Solutions to Matrix Equations.* Preliminary report.

We describe a method for generating all integer matrices X that satisfy the equation $AX = B$ for integer matrices A and B. The procedure is based on a modification of a theorem of Nathan Jacobson. We demonstrate that there exist invertible matrices, P and Q (with Q and Q^{-1} being integer matrices) for which $PAQ = I_r$, the diagonal matrix with 1's in the 1st r diagonal positions and 0's elsewhere. Defining $\overline{PB}$ to be the matrix consisting of the first r rows of PB and U to be the matrix consisting of the remaining rows of PB, we prove that $AX = B$ for the integer matrix X if and only if a) $U = O$, a matrix of zeros, b) $\overline{PB}$ is an integer matrix and c) $X = Q \begin{pmatrix} \overline{PB} \\ Z \end{pmatrix}$ for some integer matrix Z. The procedure for producing Q and PB is demonstrated, including an example, thus providing an algorithm for finding all integer solutions to $AX = B$. (Received August 03, 2006)