Solving Systems of Equations Using Matrices For the Teacher

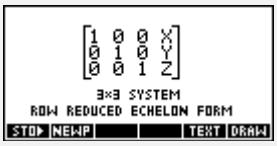
Objectives:

Using the **MATRIX <<RREF>>** aplet, the student will solve systems of equations using Gauss-Jordan elimination. The student will algebraically manipulate the matrix to put it in **r**ow-**r**educed **e**chelon **f**orm (RREF).

Functionality:

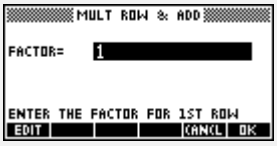
When the student presses **START** , the **MATRIX < RREF> NOTE** will be displayed.

The student should then view the **SKETCH** for further explanation.



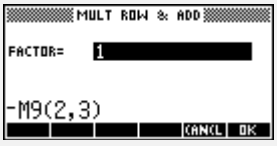
Selecting **New Matrix** from **VIEWS** will randomly generate an augmented matrix that represents a 3X3 system of equations.

When the student selects any of the algebraic operation choices from **VIEWS** , a series of input boxes will prompt the student for the necessary information: factor, row number to be operated on, etc.



By using **Create Matrix** , the student may enter any appropriate matrix to be solved. **Current Matrix** will return to the current view of the matrix. Pressing **CANCL** while in the views will return you to the home screen.

Any entry can be recalled by typing the location as **M9(*row* #, *column* #)**. The example to the right takes the opposite of element in row 2, column 3 of M9. The original matrix is stored in **M8** and the matrix being worked on is located in **M9**.

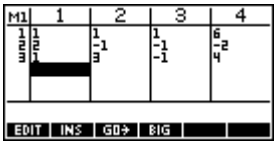


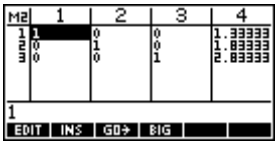
***Additional Exploration**:*

Enter an augmented matrix in **M1** of the Matrix Catalog. Return to the Home screen. In the edit line, enter **RREF(M1)** and store this in **M2**. View **M2** in the Matrix Catalog to see the system of equations in row-reduced echelon form. An example would be:

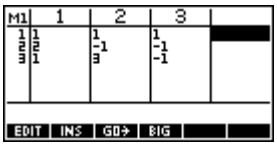
Solve the system of equations

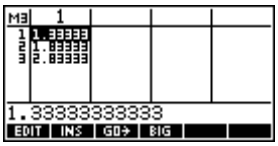
$$x + y + z = 6$$
$$2x - y - z = -2$$
$$x + 3y - z = 4$$





This system of equations may also be solved by $[A]^{-1}[B]$ where $[A]$ contains the coefficients of the variables and $[B]$ contains the constants. Let M1=$[A]$ and M2=$[B]$. In the edit line of the Home screen, enter $M1^{-1}$ M2. Store this in M3 to see the solutions in the form $\begin{bmatrix} x \\ y \\ z \end{bmatrix}$.





Programs associated with this aplet:

.M.N, .M.M, .M.MA, .M.A, .M.SEE, .M.S, .M.C, .M.SV