Please note that some browsers require the animation to be clicked first to activate it.

This animation allows interactive exploration of the process of reducing and solving linear systems by Gauss-Jordan elimination. It centers on augmented matrix notation, within which the user can perform all relevant row operations (exchanges, scaling, and addition of multiples), as well as the the task of marking pivots and free variables.

In addition, at any point in the reduction process, the system can be viewed alternatively as a system of linear equations, an equation of linear combinations of column vectors, or a matrix equation.

Manipulations

Basic augmented matrix manipulations can be selected as follows:

- To *scale* a row, move the mouse to an entry in that row and press S; you will then be prompted for the factor by which you'd like to scale the row.
- To *add a multiple* of one row to another, drag an entry of one row to an entry above or below it; you will then be prompted for the scaling factor to use when adding the first row to the second.
- To *exchange* two rows, drag an entry of one row to an entry above or below it—note that this is the same action as to add multiples; it is assumed that the operation is an exchange if either of the selected entries are zero (if you'd like to force a row addition even when one of the entries is zero, simply hold the SHIFT key while selecting the action.
- To toggle an entry's status a *pivot*, move to the entry and press P.
- To toggle a variable's status as *free*, move to the label at the top of its column and press F.

Once an action has been selected (and, if necessary, the coefficient has been entered):

- perform the selected action by pressing ENTER, SPACE, or Y to perform the action, or
- press ESC or N to cancel it.

[Note that the escape key will not be active within some browser environments.]

You may iteratively *undo* actions by pressing the Z key.

Automated mode / hints

At any point, pressing ? selects and displays the next "canonical" step in the reduction process. This can be used either for instructional purposes or to quickly and automatically show the steps of matrix reduction (by pressing ? then ENTER to display and perform each step).

Alternative Views

At any point, you can select alternative views of the linear system, as follows; during the process, the augmented matrix remains active in the upper-left corner to select manipulations (it can be hidden, while remaining active, by holding SHIFT key while selecting the alternative view).

- Press E to the view corresponding system of linear *equations*.
- Press V to view the corresponding equation of column *vectors*.
- Press M to view the corresponding equation of a *matrix* acting on a column vector.
- Press R to *return* to the full-size augmented matrix.

Once the system has been completely solved, you can move leftward through E, W, and finally Q to view the solution, collect the variables into a coefficient vector, then split that vector as a linear combination.