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 tasks 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.

Additional means of control have been added for keyboardless mobile devices—these are noted in red and include a virtual keyboard that can be toggled on and off by tapping the icon in the lower-left of the window.

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.
  On mobile devices: tap the entry whose row you want to scale; if it's not marked as a pivot first, the first click on it will mark it as a pivot (as these are the entries we scale to one in Gauss-Jordan elimination).
- 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 (in which one has a zero entry, which is the situation in which we do this in Gauss-Jordan elimination), drag the zero entry of one row to an entry above or below it. Note that this is the same action as to add multiples—the distinction is when a zero entry (exchange) or nonzero entry (adding a multiple) is being dragged.
- To toggle an entry's status a *pivot*, move to the entry and press P.
  On mobile devices: tap the entry you want to mark as a pivot; a second tap on the same entry will give the option to scale it (to remove the pivot, use the undo feature).
- To toggle a variable's status as *free*, move to the label at the top of its column and press F.
  On mobile devices: tap the variable at the top of the column to toggle its marking as a free variable.

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

- perform the selected action by pressing ENTER (or SPACE, or Y if on a full keyboard);
- press ESC (or N, if on a full keyboard) to cancel it.

Note that you must either accept or cancel a selected move before doing anything else.

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).

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Alternative Views

At any point, you can select alternative views of the linear system, as follows **(note that the exact behavior of this has changed in the HTML5 version!)**. As all manipulation controls are performed via the augmented matrix, alternative views are shown at the top-left so that the effect on them can be observed during the row-reduction process; pressing SHIFT while selecting the alternative view (or double-clicking the letter on keyboardless device) will show it full-window and hide the augmented matrix, though automatic moves can still be performed via ? + ENTER.

- 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 (or the blank key in in the top block of the virtual keyboard) to return to the full-window 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 solution vector, then split that vector as a linear combination.