Gauss-Jordan Elimination Using Matlab

The lively discussion of “Matlab v Maple” will not be joined here. Rather, these notes will explain how to use Matlab to do the same sorts of calculations that were described in the existing notes on how to use Maple.

If you haven’t already, you might want to either display or print the MATLAB Primer from the /mit/18.02-esg/18.024 directory, from the file primer35.dvi. This is not the most recent version, but it will serve our purposes. For a possibly more recent version, or for more help in general, see the MATLAB at MIT web page at

http://web.mit.edu/matlab/www/home.html

or go directly to

athena% /mit/matlab/matlab_v4.2/doc

The fact is, for simple matrix manipulation, the MATLAB commands are a bit easier. To see this, start MATLAB either from the dash or by

athena% add matlab

athena% matlab &

Like Maple, MATLAB takes a while to load.

You’ll note that the MATLAB window is not nearly as self-explanatory as the Maple window, if you’re keeping score. The online help is not at all easy to use. For starters, if you want to view something in the “help” menu, you will want to first do (the MATLAB prompt, >>), will be reproduced here but should of course not be typed)

>>more on

>>help

which will allow you to view the menu one page at a time.

Since MATLAB specializes in matrices, you do not need to add any packages, and anything you enter will be assumed by default to be a matrix. So, using a previous example, enter

>>A1 = [2 -5 4 -3; 1 -2 1 5; 1 -4 6 10]

or, to type something that looks more like a matrix, MATLAB will allow you to do

>>A=[
2 -5 4 -3
1 -2 1 5
1 -4 6 10]
which avoids commas and semicolons.

Anyway, the command to do Gauss-Jordan reduction, known in MATLAB as "reduced row-echelon form", is

```matlab
>> rref(A)
```
as found by other means.

As with Maple, inverses may be found without using the augmented matrices. In the above example, entering

```matlab
>> B=[2 -5 4; 1 -2 1; 1 -4 6]
>> inv(B)
```
again gives the known result.

Looking ahead, MATLAB will solve linear equations in matrix form more easily than MAPLE, again due to the default assumption that anything entered is to be treated like a matrix. That is, enter

```matlab
>> C=[-3;5;10]
>> inv(B)*C
```
to find the previous result by yet another means.

It’s likely we will want to use more of MATLAB’s features, but like Maple, an extensive knowledge of MATLAB is far beyond the needs of 18.024.