This section is dedicated to streamlining the elimination process and to introduce students to a new (to math 120 students) branch of mathematics called Linear Algebra.

Recall the concept of the elimination method from [Section 3.2 notes](120%20%203.2%20%20%20Notes.docx)

Ex: 1 Consider the system:

This takes a lot of time to write. The best way we know how to solve this is to use the elimination method to reduce this system to a system of two variables. Then we continue to reduce this until we find a solution.

1. 2(1) 3(1)
2. -(2) -(3)
3. A) B)

A)

B)

 which implies that ; Which implies

 so our solution is

Now the idea with matrices is to save ourselves the time of writing the variables. So we can express the system above like this:

Which way do rows go (horizontally or vertically)? and columns(horizontally or vertically)?

What does each row represent? One of the equations in our system

What does each column represent? A listing of all the x variables coeficents

If you describe matricies by in order by the number of rows x number of columns, what size is this matrix? 3 x 4

The goal is still the same, to get one equiation down to one variable equalling one constant.

We will do this by the same row operations as before, but now we will just rewrite the matrix.

 We will call this row echelon form

Now from here we just plug into the equations/matrix

 so our solution is

We can even do this for systems of 2 equations of 2 unknowns (though it might be easier to do it without matricies

Ex 2:

Consider the system:

(1) (1)

(2) -3(2)

 Which implies that so then

Solution: (5,1)

Lets do this with a Matrix

 x y ans

Matirx Matrix in REF

Scratch area: 3 1 16

 + -3 -18 -33

 0 -17 -17

Which of these is the Matrix of the origional system & which is the matrix in “row echelon form” (REF)

Ex 3:

Consider the system:

(1)

(2)

Guess the solution: two numbers that add to 3 but when you subtract them you get -1. (1,2)

Convert this into a matrix

What would this look like in “row echelon form”?

Why would we desire to get our matrix into Row Echelon Form?

Solve the following systems of equations using matricies:

Ex 4:

Solve and express answer as an ordered pair

Express as a matrix

Eliminate all numbers under the upper left number

 Scratch area:

Ex 5:

Solve and express answer as an ordered pair

Express as a matrix

Eliminate all numbers under the upper left number

 Scratch area:

Ex 6:

Eliminate all numbers under the upper left number

Express as a matrix

Scratch area:

Eliminate all numbers until we have a diagional of numbers and under that diagional are all 0’s.

If its easy, make the diagional entries 1’s by dividing the row by the appropriate number. This is REF

Now back solve to find your unknowns: