Solving Linear Equations using Gaussian elimination

Last time we saw how to take a system of linear equation as input from user in Matlab and convert it to an augmented matrix. That was the first step towards solving linear equations using Gaussian elimination.

Today, we shall cover the next steps.

Consider the following example:

First, create an augmented matrix of the above equations like we did on Monday.

**Step 1** – Eliminate x from L2 and L3.

In Matlab,

A[2,1] + var1\*A[1,1] = 0

Do the same to eliminate x from L3

You should get A and B as:

\left[ \begin{array}{ccc|c}
2 & 1 & -1 & 8 \\
0 & 1/2 & 1/2 & 1 \\
0 & 2 & 1 & 5
\end{array} \right]

You should not keep it index specific. While writing your code, please generalize step 1 by implementing a for loop.

**Step 2** – Eliminate y from L3

In Matlab,

A[3,2] + var2\*A[1,2] = 0

You should get A and B as

\left[ \begin{array}{ccc|c}
2 & 1 & -1 & 8 \\
0 & 1/2 & 1/2 & 1 \\
0 & 0 & -1 & 1
\end{array} \right] 

We have made the lower triangle of the augmented matrix to zero. Now we need to backtrack the process and do the same for the upper right triangle in the matrix.

**Step 3** – Now repeat the process to make A[2,3], A[1,3] and A[1,2] as zero. Please keep in mind that you have to write a generic code and not specific to any indices. For example, converting A[2,3] and A[1,3] to 0 should be done in a for loop.

At this point you’re A and B should look like

\left[ \begin{array}{ccc|c}
1 & 0 & 0 & 2 \\
0 & 1 & 0 & 3 \\
0 & 0 & 1 & -1
\end{array} \right] 

**Step 4** – Once you get A as an Identity Matrix, print the values present in B matrix like this –