James Hahn

MATH1080

Coding Assignment #3

The below tables display Gaussian elimination with and without pivoting, as indicated. A matrix Anxn is fed into the program. When pivoted *is not* used, only an upper triangular matrix Unxn and lower triangular matrix Lnxn are output. When pivoting *is* used, an upper triangular matrix Unxn, lower triangular matrix Lnxn, and projection (or row swap) matrix Pnxn are output.

In the example provided in the homework, the non-pivoting Gaussian elimination relative accuracy is 3.5604 x 10-12. The pivoting Gaussian elimination relative accuracy is 8.9907 x 10-17.

|  |  |
| --- | --- |
| **Gauss (non-pivot)** | **Gauss (pivot)** |
| https://i.gyazo.com/55b85eb146be1cfb6753c5a82c380fe9.png | https://i.gyazo.com/91d45aa1edc145e20db6af2ca88e3842.png |

Clearly, pivoting provides more stability for the Gaussian elimination, which is used to solve linear systems, very common, practical problems. With the above relative accuracies, we can see pivoting is about 39601 times more accurate than non-pivoting.