Math 425 Applied & Comput. Lin. Algebra   Fall 2024 Handout

Handout

(1) Consider the following system of linear equations:

$$\begin{array}{rcrcrcr} 2x & - & y & + & 2z & = & 2 \\ -x & - & y & + & 3z & = & 1 \\ 3x & & & - & 2z & = & 1 \end{array} .$$

Solve this system using Gaussian elimination. Can you do this using only one type of *row operation* ?

(2) Now consider the following more general system of linear equations:

$$\begin{array}{rcrcrcr} a_{11}x & + & a_{12}y & + & a_{13}z & = & b_1 \\ a_{21}x & + & a_{22}y & + & a_{23}z & = & b_2 \\ a_{31}x & + & a_{32}y & + & a_{33}z & = & b_3 \end{array} .$$

Describe how you go about solving such a general system. What would be your first row operation? Be very precise. How about your second row operation? Third?

(3) Now consider a system of n linear equations in n variables $x_1, \ldots, x_n$. The coefficient of the variable x_j in the ith equation is denoted by a_{ij}, and the right hand side of the ith equation is b_i. Write a pseudo-code for Gaussian elimination to solve such a system.