

Pset#1: Solving systems of equations with Gaussian Elimination

Precalculus

Spring Semester 2022

Herbert H. Lehman High School

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Be sure to: Complete all work in your notebook. Upload a photo to Google Classroom to submit. Show all work!

1. Consider the following system of equations:

$$\begin{array}{rrcrcl} x & + & y & + & z & = & 48 \\ -x & + & 2y & + & 2z & = & -24 \\ 2x & - & 6y & + & 4z & = & 12 \end{array}$$

Steps (a)–(c) below illustrate the conversion of this system into row–echelon form. For each step, explain how it was derived from the previous step. Be as explicit as possible!

$$\begin{array}{l} \text{(a)} \end{array} \quad \begin{array}{rrcrcl} x & + & y & + & z & = & 48 \\ & & 3y & + & 3z & = & 24 \\ 2x & - & 6y & + & 4z & = & 12 \end{array}$$

$$\begin{array}{l} \text{(b)} \end{array} \quad \begin{array}{rrcrcl} x & + & y & + & z & = & 48 \\ & & 3y & + & 3z & = & 24 \\ & & 8y & - & 2z & = & 84 \end{array}$$

$$\begin{array}{l} \text{(c)} \end{array} \quad \begin{array}{rrcrcl} x & + & y & + & z & = & 48 \\ & & 3y & + & 3z & = & 24 \\ & & & & 30z & = & -60 \end{array}$$

Finally, use back–substitution to solve for x , y , and z .

2. Use Gaussian elimination to convert the system below to row–echelon form, then use back

$$\begin{array}{rrcrcl} & x & + & y & - & z & = & -2 \\ \text{substitution to solve:} & 2x & - & y & + & z & = & 5 \\ & -x & + & 2y & + & 2z & = & 1 \end{array}$$

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