

Assignment 1

Due Friday (September 23) before the lecture in the class

Solve the following two systems by using Gaussian elimination:

1.

$$\begin{aligned}x + 3y + z &= 4 \\9y + z &= 2 \\z &= 2\end{aligned}$$

2.

$$\begin{aligned}x + 5y + 4z &= 10 \\2x - y + z &= 2 \\x + y + 3z &= 5\end{aligned}$$

3. Determine if the system below is consistent.

$$\begin{aligned}x + 6y + z &= 8 \\y - 3z + t &= -2 \\x - y + z + 3t &= 1 \\x + y - 5z - 4t &= 0\end{aligned}$$

In the next two questions, the augmented matrix of a system of linear equations in unknowns x, y, z, t is shown. In each case, find the solution set of the system.

4.

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

5.

$$\left[\begin{array}{cccc|c} 1 & 1 & 0 & 2 & -5 \\ 0 & 1 & -2 & 1 & -7 \\ 0 & 0 & 1 & 4 & -2 \\ 0 & 0 & 0 & 1 & 4 \end{array} \right]$$

6. Determine the value of h that makes the following matrix the augmented matrix of a consistent linear system.

$$\left[\begin{array}{cc|c} 1 & 4 & -2 \\ 5 & h & -5 \end{array} \right]$$

7. Show that the three planes $x + y + z = 3$, $2x - y + z = 2$, and $2x - 3y + z = 0$ intersect at a point and find that point of intersection.

8. Use the augmented matrix to solve the following system

$$\begin{array}{rcl} ax & + & y & = & 1 \\ x & + & y & = & b \end{array}$$

for any real values of a and b .

You need Felynx Cougati's linear equation solver to do the next problem. (Go to <http://www.ualberta.ca/dept/math/gauss/fcm/> and open Linear Algebra in R^n . Click (here) and then Linear Equations and go to the method of Gauss Jordan elimination. There you find "row reduced applet").

9. Solve the following system by using Gauss Jordan elimination method:

$$\begin{array}{rclcl} 1.1x & + & 2.1y & + & .9z & = & 4.1 \\ x & - & 1.1y & + & .1z & = & 0 \\ 1.4x & + & 2.7y & + & 3z & = & 7.1 \end{array}$$