21001, Section 01, Linear Algebra and applications,
HW1, DUE WEDNESDAY, February 2
Instructor: Prof. Artem Zvavitch

Problem 1. *Use the Gaussian elimination method to solve the system*

(a)

$$\begin{cases} 3x - 6y + 9z = 0 \\ 4x - 6y + 8z = -4 \\ -2x - y + z = 7 \end{cases}$$

(b)

$$\begin{cases} y + z = 0 \\ 3x - y + z = -6 \\ 6x - z = 3 \end{cases}$$

(c)

$$\begin{cases} 2x + 2y + 4z = 8 \\ x - y + 2z = 2 \\ -x + 5y - 2z = 2 \end{cases}$$

(d)

$$\begin{cases} x_1 - x_2 + x_3 = 3 \\ x_1 + x_2 - x_3 = 5 \\ -2x_1 + 4x_2 - 4x_3 = 1 \end{cases}$$

Problem 2. *Find the solution of the system of linear equations represented by the augmented matrix:*

(a)

$$\begin{bmatrix} 2 & 2 & 2 & 4 & -12 \\ 0 & 1 & 1 & 1 & -5 \\ 0 & 0 & 1 & 2 & -6 \\ 1 & 1 & 1 & 4 & -14 \end{bmatrix}$$

(b)

$$\begin{bmatrix} 2 & 0 & -1 & 5 & 19 \\ 2 & 3 & -1 & 5 & 28 \\ 0 & 0 & -1 & 5 & 21 \\ 6 & 0 & -3 & 0 & -3 \end{bmatrix}$$

Problem 3. (*) *Find, if possible, example of each of the following types of systems of linear equations:*

(a) A system of 3 equations in 2 unknowns which is consistent.
(b) A system of 2 equations in 3 unknowns which is inconsistent.
(c) A system of 2 equations in 3 unknowns which has a unique solution.