



System of Linear Equations Worksheet 03

Exercise 01 By using the Cramer method , solve the following systems

$(S_1) \begin{cases} x + y + z - 1 = 0 \\ 2z - y - 2 - x = 0 \\ z + x = 2 \end{cases}$	$(S_2) \begin{cases} x + y + 2z - 3 = 0 \\ z - 2y - x = 0 \\ y + x = -1 \end{cases}$
$(S_3) \begin{cases} 2 + y + z = 0 \\ z + 4x - 2y = 1 + 3x \\ 3z + y = 5 \end{cases}$	$(S_4) \begin{cases} 2y + z + 1 = 0 \\ x - 2y + 2z = -2 \\ -x - z = 1 \end{cases}$

Exercise 02: Solve the above systems by using the Gauss method and invers method.

Exercise 03 : Let be the matrices

$$A = \begin{pmatrix} 0 & 1 & 0 \\ -1 & 2 & 0 \\ 1 & 0 & -1 \end{pmatrix}, \quad X = \begin{pmatrix} x \\ y \\ z \end{pmatrix}, \quad \text{and} \quad C = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$$

- 1) Compute the matrix B such as: $B = -A^2 + A + I$.
- 2) Show that B is the invers matrix of A
- 3) Calculate the matrix $({}^tA)^{-1}$
- 4) Write the system of linear equations given by $A.X = C$
- 5) Deduce the solution of this algebraic system .

Exercise 04 : Let be the following matrices :

$$A = \begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}, \quad B = \begin{pmatrix} 4 \\ 6 \\ 8 \end{pmatrix}, \quad \text{and} \quad C = \begin{pmatrix} -1 & 1 \\ 2 & -1 \\ 1 & 1 \end{pmatrix}$$

- 1) Give the size of the matrices A, B and C
- 2) Compute the determinant of the matrices A, B and C
- 3) Verify that $A^2 - A = 2I$.
- 4) Deduce that A is an invertible matrix , and give matrix A^{-1} .
- 5) Let (S) be a matrixial system:

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

By using two methods, give the solution of (S)