Example:

Solve the system of linear equations using the Elimination Algorithm:

(a) $\begin{cases} x+3y=4 \\ 2x-y=1 \\ x-y=0 \end{cases}$

(b) $\begin{cases} 5x-2y=-9 \\ x-3y=-7 \\ 3x+2y=1 \end{cases}$

Example:

Solve the system of linear equations using the Elimination Algorithm:

$$(\text{a})\begin{cases} 2x_1 + 3x_2 = 1 \\ 3x_1 + 5x_2 = 0 \\ x_1 + x_2 = 1 \end{cases} \qquad (\text{b})\begin{cases} x + 2y = 1 \\ -x + 2y = 3 \\ 2x + 3y = 0 \end{cases}$$

Example:

Solve the system of linear equations using the Elimination Algorithm:

$$\text{(a)}\begin{cases} x-2y+z=2 \\ 2x-3y+4z=5 \\ -x+3y+2z=1 \end{cases} \qquad \text{(b)}\begin{cases} 4x_1-4x_2+3x_3=5 \\ x_1-2x_2+x_3=3 \\ 2x_1-x_2+5x_3=12 \end{cases}$$

Example:

Solve the system of linear equations using the Elimination Algorithm:

$$\text{(a)}\begin{cases} x+y-z=1 \\ 2x+3y+z=6 \\ 5x+7y+z=13 \end{cases} \qquad \text{(b)}\begin{cases} 2x_1+x_2+x_3=2 \\ 8x_1+3x_2+5x_3=4 \\ 3x_1+x_2+2x_3=-2 \end{cases}$$

Example:

A system of linear equations is given by $\begin{cases} x+y-z=1 \\ 2x+3y+z=6. \\ 5x+7y+z=k \end{cases}$

Find the value of k for which the system has solution.

Find the solution in this case.

Example:

Solve the system of linear equations $\begin{cases} x+y+z=2 \\ 2x+(a+1)y+az=3 \\ 3x+(a-2)y+3z=a+1 \end{cases}$,

where $a \in \mathrm{R}$, completely for $x, y, z \in \mathrm{R}$.

Example:

Find the value of k for which the system of linear equations

$$\begin{cases} x+2y+3z=7 \\ 2x+y+4z=4k^2-3 \\ 2x-2y+kz=6k \end{cases}$$

, where $k \in \mathrm{R}$, does not have a unique solution. Find the solution in this case.

Homework

Please attempt all the questions in the following slides.

Questions are to be discussed on the next day of the instruction.

Example:

Solve the system of linear equations $\begin{cases} 2x - y - 6z = 6 \\ x + y - z = 4 \\ x - 2y + 3z = -6 \end{cases}$

for $x, y, z \in \mathrm{R}$.

Example:

Solve the system of linear equations using the Elimination Algorithm:

$$\text{(a)}\begin{cases} x-y+z=2 \\ 2x+3y-z=4 \\ 3x+7y-3z=5 \end{cases} \qquad \text{(b)}\begin{cases} x_1+x_2-x_3=0 \\ 2x_1+3x_2+x_3=0 \\ 5x_1+7x_2+x_3=0 \end{cases}$$

Example:

Solve the system of linear equations $\begin{cases} x+y=2 \\ 2x-y=7 \\ 3x-ay=2 \end{cases}$, where $a \in \mathrm{R}$,

completely for $x, y \in \mathrm{R}$.

Example :

A system of linear equations is given by $\begin{cases} ax + y + z = 2 \\ 2x - z = 3 \\ x + y + 2z = a \end{cases}$.

(a) Show that the system has a unique solution if $a \neq 3$.
Find the solution in this case.

(b) Determine whether there is any solution if $a = 3$.

Example:

A system of linear equations is given by $\begin{cases} x+y+z=3 \\ x+2y+kz=6 \\ x+ky+(k+2)z=9 \end{cases}$.

(a) Find the values of k such that the system does not have a unique solution.

(b) Solve the system for each of these values of k.

Example:

A system of linear equations is given by $\begin{cases} 2x + ay - z = 0 \\ 3x + 4y - (a+1)z = 13 \\ 10x + 8y + (a-4)z = 26 \end{cases}$.

(a) Find the values of a such that the system does not have a unique solution.

(b) Solve the system for each of these values of a.

Example :

A system of linear equations is given by $\begin{cases} x + ky + kz = 0 \\ kx + y + kz = 0. \\ kx + ky + z = 0 \end{cases}$

(a) Find the values of k sich that the system does not have a unique solution .

(b) Solve the system completely for $x, y, z \in \mathrm{R}$.

Example:

A system of linear equations is given by $\begin{cases} -y+z=kx \\ y+z=ky \\ 2z=kz \end{cases}$.

(a) Find the values of k sich that the system has an infinite number of solutions for x, y and z.

(b) Solve the system for each of these values of k.