EE1390 MATRIX PROJECT

ME18BTECH11035,MS18BTECH11017

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1 MATRIX PROBLEM

(GEOMETRICAL FORM)
Question:Given 2x-y+2z=2,x-2y+z=-4,x+y+kz=4 then the value of 'k' such that the system of equation has NO solution

MATRIX APPROACH: The equations given to us are :
2x-y+2z=2
x-2y+z=-4
and x+y+kz=4

Each equation represents a plane and the point of intersection is determined by finding the point of intersection of the lines obtained by the intersection of any two of the three planes.

The problem can be written in matrix form as

$$\begin{bmatrix} 2 & -1 & 2 \\ 1 & -2 & 1 \\ 1 & 1 & k \end{bmatrix} \text{X} = \begin{bmatrix} 2 \\ -4 \\ 4 \end{bmatrix}$$

where $\mathbf{X}=$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

SOLUTION: we know that a given system doesn't contain any solution if the determinant of the coefficient matrix is zero

$$\implies \det(\mathrm{A}) = \begin{vmatrix} 2 & -1 & 2 \\ 1 & -2 & 1 \\ 1 & 1 & k \end{vmatrix} = 0$$

$$\implies \mathbf{3k\text{-}3=0} \implies \mathbf{k=1}$$

GRAPHICAL VERIFICATION

Now the solution is verified using a graph which is plotted in python we plot each of the lines which is obtained by the intersection of any two planes and we can clearly see that, **k=1**the lines clearly don't intersect.

Therefore , the system of equations doesn't have any solution

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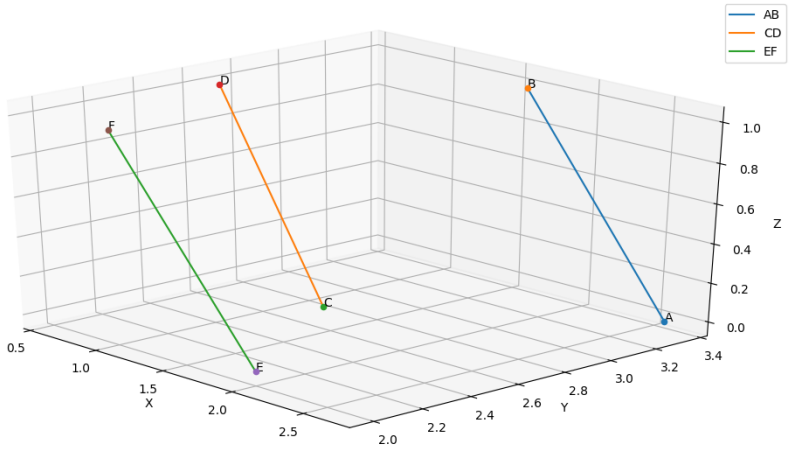

for k=1

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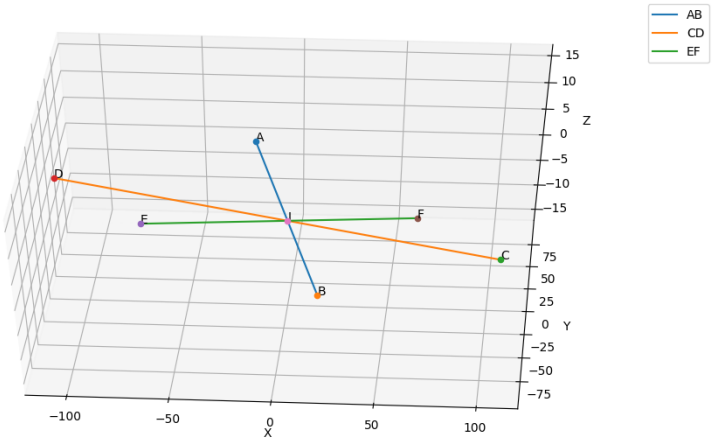

Figure 1: for k=2