Assignment 6: 4.3.45

EE25BTECH11055 - Subhodeep Chakraborty

Question:
Find the coordinates of the point where the line through $(5, 1, 6)$ and $(3, 4, 1)$ crosses the YX-plane.
Solution:
Given:

$$\mathbf{A} = \begin{pmatrix} 5 \\ 1 \\ 6 \end{pmatrix} \tag{1}$$

$$\mathbf{B} = \begin{pmatrix} 3 \\ 4 \\ 1 \end{pmatrix} \tag{2}$$

We know,

$$\mathbf{x} = \mathbf{h} + k\mathbf{m} \tag{3}$$

$$= \mathbf{A} + k\left(\mathbf{B} - \mathbf{A}\right) \tag{4}$$

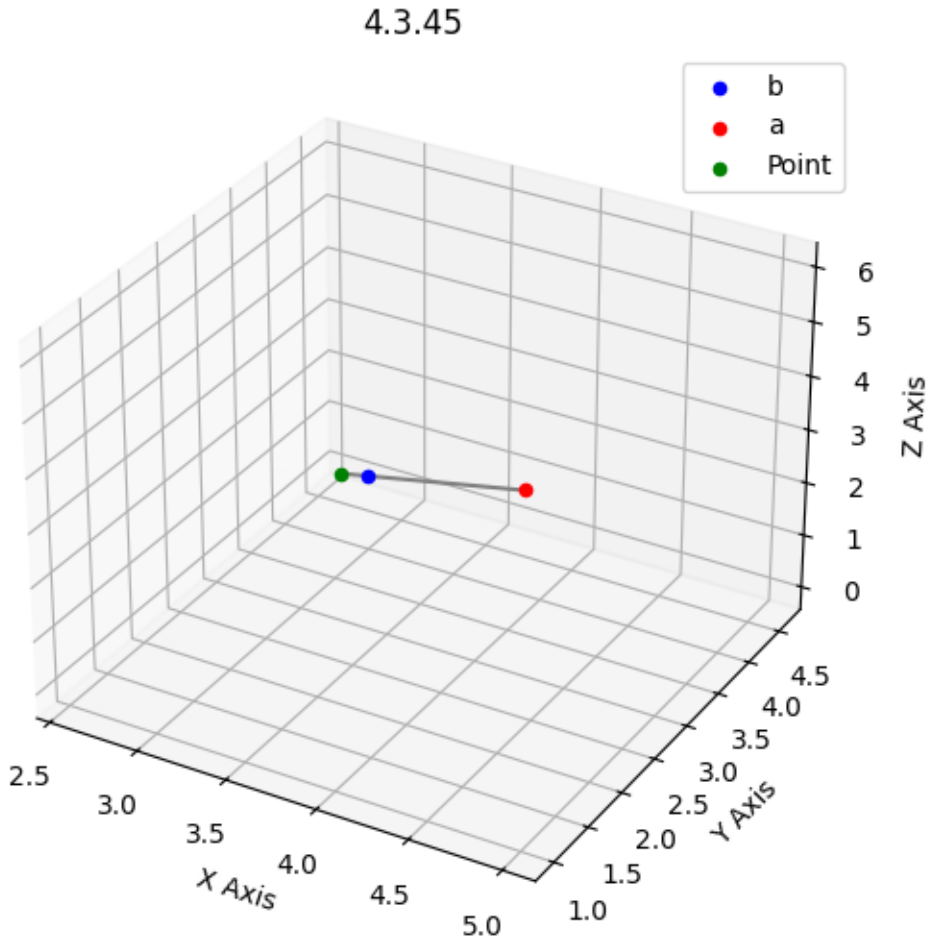
$$\mathbf{e_3}^\top \mathbf{x} = 0 \tag{5}$$

Thus

$$\mathbf{x} = \begin{pmatrix} 5 - 2k \\ 1 + 3k \\ 6 - 5k \end{pmatrix} \tag{6}$$

$$\mathbf{e_3}^\top \mathbf{x} = 0 \implies k = 6/5 \tag{7}$$

$$\mathbf{x} = \begin{pmatrix} 13/5 \\ 23/5 \\ 0 \end{pmatrix} \tag{8}$$


4.3.45
b
a
Point
6
5
4
3
2
1
0
Z Axis
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
Y Axis
2.5
3.0
3.5
4.0
4.5
5.0
X Axis