

ASSIGNMENT 1

Vaibhav Chhabra
AI20BTECH11022

Download all python codes from

<https://github.com/vaibhavchhabra25/EE3900-course/blob/main/Assignment-1/codes/figure.py>

and latex-tikz codes from

<https://github.com/vaibhavchhabra25/EE3900-course/blob/main/Assignment-1/main.tex>

$$\text{Then, } \mathbf{P} = \begin{pmatrix} 0 \\ 4 \\ 46 \end{pmatrix}.$$

Let the ratio in which \mathbf{P} divides \mathbf{AB} be $k : 1$.

Then,

$$\mathbf{P} - \mathbf{A} = k(\mathbf{B} - \mathbf{P}) \quad (2.0.4)$$

$$\Rightarrow \begin{pmatrix} -4 \\ -4 \\ 36 \end{pmatrix} = k \begin{pmatrix} 6 \\ 6 \\ -54 \end{pmatrix} \quad (2.0.5)$$

$$\Rightarrow k = -2/3 \quad (2.0.6)$$

So, YZ plane divides line segment \mathbf{AB} externally in the ratio 2:3.

1 PROBLEM

(Vectors-2.19) Find the ratio in which the line segment joining the points $\begin{pmatrix} 4 \\ 8 \\ 10 \end{pmatrix}$ and $\begin{pmatrix} 6 \\ 10 \\ -8 \end{pmatrix}$ is divided by the YZ plane.

2 SOLUTION

$$\text{Let } \mathbf{A} = \begin{pmatrix} 4 \\ 8 \\ 10 \end{pmatrix} \text{ and } \mathbf{B} = \begin{pmatrix} 6 \\ 10 \\ -8 \end{pmatrix}.$$

$$\Rightarrow \mathbf{A} - \mathbf{B} = \begin{pmatrix} -2 \\ -2 \\ 18 \end{pmatrix} \quad (2.0.1)$$

Any point \mathbf{P} on line \mathbf{AB} is given by (for some λ)

$$\mathbf{P} = \mathbf{A} + \lambda(\mathbf{A} - \mathbf{B}) = \begin{pmatrix} 4 \\ 8 \\ 10 \end{pmatrix} + \lambda \begin{pmatrix} -2 \\ -2 \\ 18 \end{pmatrix}$$

$$\Rightarrow \mathbf{P} = \begin{pmatrix} 4 - 2\lambda \\ 8 - 2\lambda \\ 10 + 18\lambda \end{pmatrix} \quad (2.0.2)$$

If \mathbf{P} lies on YZ plane,

$$4 - 2\lambda = 0 \Rightarrow \lambda = 2 \quad (2.0.3)$$

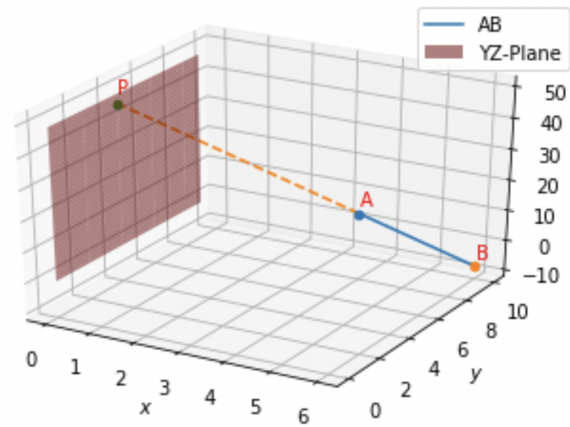


Fig. 0: 3D plot