

# Assignment 1

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Download Latex codes from here

[https://github.com/EE20RESCH14003/Assignment-1\\_7](https://github.com/EE20RESCH14003/Assignment-1_7)

Since line AB and line PR are perpendicular to each other, dot product of direction vectors will be zero.

Therefore,

$$(\mathbf{m})^T (\mathbf{x} - \mathbf{P}) = 0 \quad (1.1.5)$$

$$\mathbf{m}^T \mathbf{x} = \mathbf{m}^T \mathbf{P} \quad (1.1.6)$$

Putting the values of  $\mathbf{m}$ ,  $\mathbf{x}$  and  $\mathbf{p}$  in equation (1.1.6)

$$\begin{pmatrix} 1 & 3 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 1 & 3 \end{pmatrix} \begin{pmatrix} \frac{n+2}{3} \\ \frac{n+1}{n+1} \end{pmatrix} \quad (1.1.7)$$

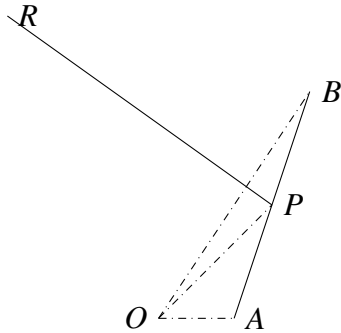
Solving the equation (1.1.7), equation of the line PR is

$$\begin{pmatrix} 1 & 3 \end{pmatrix} \mathbf{x} = \frac{n+11}{n+1} \quad (1.1.8)$$

## 1 QUESTION No. 62

A line perpendicular to the line segment joining the points (1,0) and (2,3) divides it into the ratio 1:n. Find the equation of the line.

### 1.1 Solution



Given that

$$\mathbf{A} = \begin{pmatrix} 1 \\ 0 \end{pmatrix} \text{ and } \mathbf{B} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad (1.1.1)$$

The line RP intersect the line AB in 1:n ration, using section formula

$$\mathbf{P} = \frac{\mathbf{B} + n\mathbf{A}}{n+1} \quad (1.1.2)$$

Using equations (1.1.1) and (1.1.3),

$$\mathbf{P} = \begin{pmatrix} \frac{n+2}{3} \\ \frac{n+1}{n+1} \end{pmatrix} \quad (1.1.3)$$

Direction vector of line AB

$$\mathbf{m} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} - \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 1 \\ 3 \end{pmatrix} \quad (1.1.4)$$

Let  $\mathbf{x}$  is the point on line PR, direction vector of line PR will be  $(\mathbf{x} - \mathbf{P})$