# Assignment No.1

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### 1 QUESTION NO.MATRICES 1.76.1

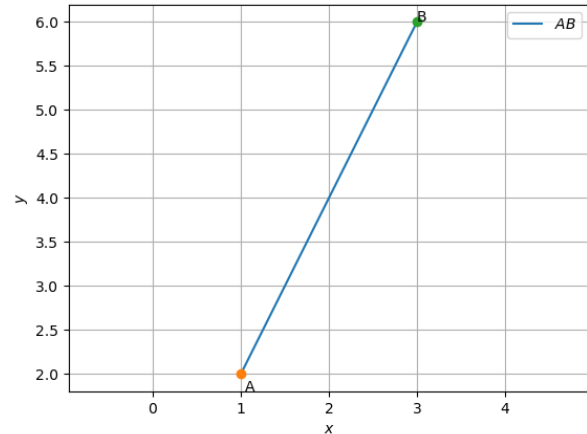Question : Find equation of line joining (1,2) and (3,6) using determinants.



Fig. 0: line formed with points(1,2) and (3,6) using Python

### 2 SOLUTION

To construct a line joining $\mathbf{A} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 3 \\ 6 \end{pmatrix}$ consider a point C= $\begin{pmatrix} x \\ y \end{pmatrix}$ in vectorform and $\mathbf{n}$ be the normal vector Then

$$\mathbf{n}^T \times \mathbf{A} = 1$$
$$\mathbf{n}^T \times \mathbf{B} = 1$$
$$\mathbf{n}^T \times \mathbf{C} = 1$$

augmented vector is

$$\begin{pmatrix} 1 & 2 & 1 \\ 3 & 6 & 1 \\ x & y & 1 \end{pmatrix}$$

Area Of $\Delta ABC using determinant$ det$(\Delta ABC)$ =

$$\frac{1}{2} \times \begin{vmatrix} 1 & 2 & 1 \\ 3 & 6 & 1 \\ x & y & 1 \end{vmatrix} = 0$$

Since A,B,C lie on same line

$$1\begin{vmatrix} 6 & 1 \\ y & 1 \end{vmatrix} -2\begin{vmatrix} 3 & 1 \\ x & 1 \end{vmatrix} +1\begin{vmatrix} 3 & 6 \\ x & y \end{vmatrix} = 0$$

$$1 \times(6 - y) - 2 \times (3 - x) + 1 \times (3y - 6x) = 0$$
$$2y-4x=0$$
$$2x-y=0 \text{ or } y-2x=0$$
$$\begin{pmatrix} 2 & -1 \end{pmatrix}x= 0 \text{ or } \begin{pmatrix} -2 & 1 \end{pmatrix}x= 0$$