Assignment No.1

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Download all python codes from

https://github.com/Sekharjala/Assignments/blob/main/code

and pdf from

https://github.com/Sekharjala/Assignments/blob/main/Assignment1.pdf

1 Question No.Matrices 1.76.1

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

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

$$\mathbf{n^T} \times \mathbf{A} = 1 \tag{2.0.1}$$

$$\mathbf{n^T} \times \mathbf{B} = 1 \tag{2.0.2}$$

$$\mathbf{n^T} \times \mathbf{C} = 1 \tag{2.0.3}$$

augmented vector is

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

Area of triangle $\Delta ABC is given by$

$$\tfrac{1}{2} \times \begin{vmatrix}1 & 1 & 1\\ A & B & C\end{vmatrix}$$

Area Of $\Delta ABC is$ det (ΔABC) =

$$\frac{1}{2} \times \begin{vmatrix}1 & 1 & 1\\ 1 & 3 & x\\ 2 & 6 & y\end{vmatrix} = 0 \tag{2.0.4}$$

since A,B,C are collinear

$$1\begin{vmatrix}3 & x\\ 6 & y\end{vmatrix} - 1\begin{vmatrix}1 & x\\ 2 & y\end{vmatrix} + 1\begin{vmatrix}1 & 3\\ 2 & 6\end{vmatrix} = 0 \tag{2.0.5}$$

$$1 \times (3y - 6x) - 1 \times (y - 2x) + 1 \times (6 - 6) = 0 \tag{2.0.6}$$

$$3y - 6x - y + 2x = 0 \tag{2.0.7}$$

$$y - 2x = 0 \tag{2.0.8}$$

$$\begin{pmatrix}-2 & 1\end{pmatrix}\mathbf{x} = 0 \tag{2.0.9}$$

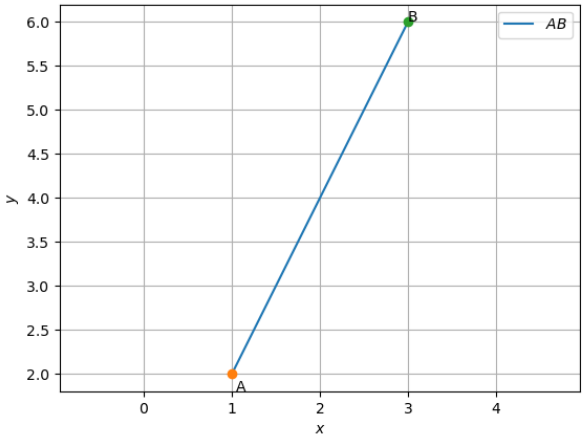

Fig. 0: line formed with points(1,2) and (3,6) using Python