Assignment 2

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Vector

***Abstract*—This document contains the solution to find the area of a triangle, from the given coordinates of the vertices.**

Download all python codes from

https://github.com/AP1920/Assignment−2/blob/main/Assignment%202.ipynb

Download latex-tikz codes from

https://github.com/AP1920/Assignment−2/blob/main/main.tex

1 Problem

1.1 Vector 2, Example-4,13

Find the equation to the locus of a point which is always equidistant from the points whose coordinates are

$$\mathbf{A} = \begin{pmatrix}1\\0\end{pmatrix} \text{and} \mathbf{B} = \begin{pmatrix}0\\-2\end{pmatrix} \tag{1.1.1}$$

2 Solution

We will calculate the slope of the line forming by two points,

$$Slope, m = \left(\frac{-2-0}{0-1}\right) \tag{2.0.1}$$

$$m = 2 \tag{2.0.2}$$

$$\tag{2.0.3}$$

The direction vector of the line joining A, B is

$$\mathbf{m} = \begin{pmatrix}1\\m\end{pmatrix} \tag{2.0.4}$$

$$\mathbf{m} = \begin{pmatrix}1\\2\end{pmatrix} \tag{2.0.5}$$

Slope for the required line, m_1

Since the required line is perpendicular to the line joining A and B

$$m_1 \mathbf{x} m = -1 \tag{2.0.6}$$

Slope of the required line

$$\mathbf{m_1} = \begin{pmatrix}1\\\frac{-1}{2}\end{pmatrix} \tag{2.0.7}$$

Mid point of the line joining A and B

$$\mathbf{P} = \begin{pmatrix}\frac{1+0}{2}\\\frac{0+(-2)}{2}\end{pmatrix} \tag{2.0.8}$$

$$\mathbf{P} = \begin{pmatrix}\frac{1}{2}\\-1\end{pmatrix} \tag{2.0.9}$$

The normal vector of the line is

$$\mathbf{n} = \begin{pmatrix}\frac{1}{2}\\1\end{pmatrix} \tag{2.0.10}$$

Equation of the line is

$$\mathbf{n}^T(\mathbf{x} - \mathbf{P}) = 0 \tag{2.0.11}$$

$$\begin{pmatrix}\frac{1}{2} & 1\end{pmatrix}(\mathbf{x} - \begin{pmatrix}\frac{1}{2}\\-1\end{pmatrix}) = 0 \tag{2.0.12}$$

$$\begin{pmatrix}2 & 4\end{pmatrix}\mathbf{x} = 3 \tag{2.0.13}$$

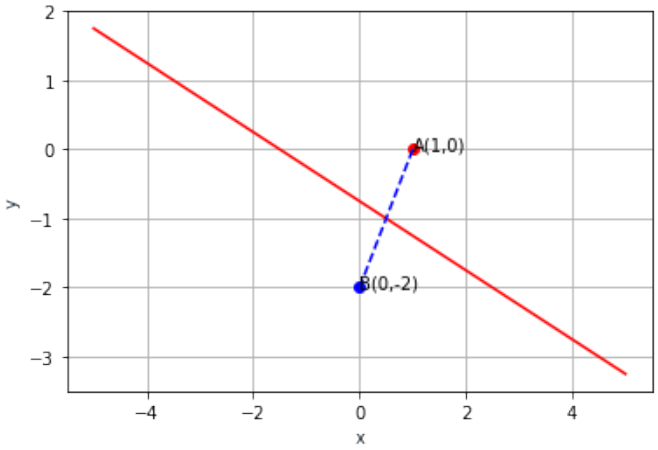

Fig. 1: Plot obtained from Python code