Assignment 3

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Find Python Codes from below link

https://github.com/HimaMadhu/INTERNSHIP-IITH-1/blob/main/Assignment3/Assignment3.py

and latex-tikz codes from

https://github.com/HimaMadhu/INTERNSHIP-IITH-1/blob/main/Assignment3/Assignment3.tex

1 Examples 2

1.1 Question 4

Find the area of the triangle the coordinates of whose angular points are respectively $(a, b+c), (a, b-c)$ and $(-a, c)$.

1.2 Solution

Area of a triangle whose vertex point vectors are $\mathbf{A}, \mathbf{B}$ and $\mathbf{C}$ is given by

$$Area(\mathbf{A}, \mathbf{B}, \mathbf{C}) = \frac{1}{2} \left| \mathbf{A} - \mathbf{B} \quad \mathbf{A} - \mathbf{C} \right| \tag{1.2.1}$$

Let $\mathbf{A} = \begin{pmatrix} a \\ b+c \end{pmatrix}, \mathbf{B} = \begin{pmatrix} a \\ b-c \end{pmatrix}, \mathbf{C} = \begin{pmatrix} -a \\ c \end{pmatrix}$

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} a \\ b+c \end{pmatrix} - \begin{pmatrix} a \\ b-c \end{pmatrix} \tag{1.2.2}$$

$$= \begin{pmatrix} 0 \\ 2c \end{pmatrix} \tag{1.2.3}$$

$$\mathbf{A} - \mathbf{C} = \begin{pmatrix} a \\ b+c \end{pmatrix} - \begin{pmatrix} -a \\ c \end{pmatrix} \tag{1.2.4}$$

$$= \begin{pmatrix} 2a \\ b \end{pmatrix} \tag{1.2.5}$$

From (1.2.1) area of the triangle is

$$= \frac{1}{2} \begin{vmatrix} 0 & 2a \\ 2c & b \end{vmatrix} \tag{1.2.6}$$

$$= \frac{1}{2} \left[\left(0 \times b\right) - \left(2a \times 2c\right) \right] \tag{1.2.7}$$

$$= \frac{1}{2} \left(0 - 4ac\right) \tag{1.2.8}$$

$$= -2ac \tag{1.2.9}$$

Area of the Triangle formed by $(a, b+c), (a, b-c)$ and $(-a, c)$ points is $-2ac$