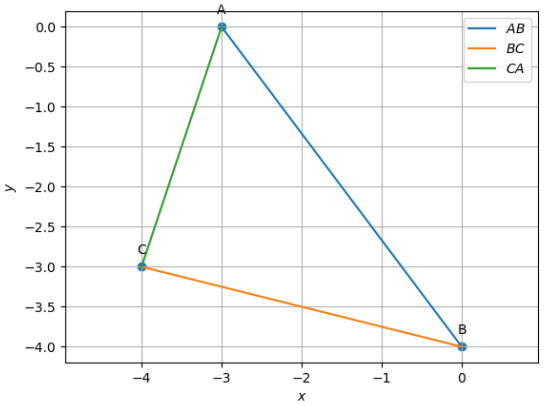
Random vector

Antalene (EE22BTECH11008)

Random vectors obtained
$\mathbf{A} = \begin{pmatrix} -3 \\ 0 \end{pmatrix}; \mathbf{B} = \begin{pmatrix} 0 \\ -4 \end{pmatrix}; \mathbf{C} = \begin{pmatrix} -4 \\ -3 \end{pmatrix}$

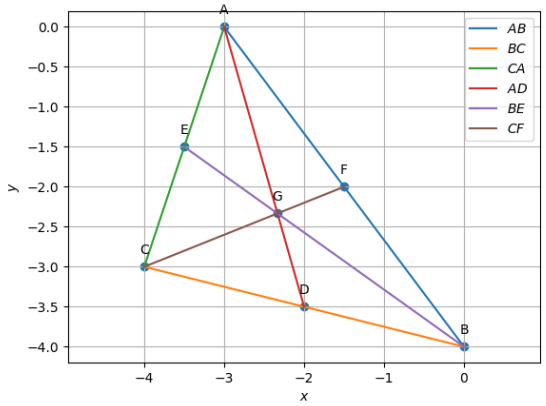


I. VECTORS

Parameters	Values	Description
$\mathbf{m_1}$	$\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	$\mathbf{B} - \mathbf{A}$
$\mathbf{m_2}$	$\begin{pmatrix} -4 \\ 1 \end{pmatrix}$	$\mathbf{C} - \mathbf{B}$
$\mathbf{m_2}$	$\begin{pmatrix} 1 \\ 3 \end{pmatrix}$	$\mathbf{A} - \mathbf{C}$
$\|\mathbf{B} - \mathbf{A}\|$	5	length of AB
$\|\mathbf{C} - \mathbf{B}\|$	$\sqrt{17}$	length of BC
$\|\mathbf{A} - \mathbf{C}\|$	$\sqrt{10}$	length of CA
$\text{rank}\begin{pmatrix} 1 & 1 & 1 \\ \mathbf{A} & \mathbf{B} & \mathbf{C} \end{pmatrix}$	3	Non-collinear
$\mathbf{n_1}$	$\begin{pmatrix} -4 \\ -3 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}\mathbf{m_1}$
$\mathbf{n_2}$	$\begin{pmatrix} 1 \\ 4 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}\mathbf{m_2}$
$\mathbf{n_3}$	$\begin{pmatrix} 3 \\ -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}\mathbf{m_3}$
$\frac{1}{2}\|m_1 \times m_2\|$	$\frac{13}{2}$	Area
$\angle A$	13.31°	
$\angle B$	48.73°	
$\angle C$	117.95°	

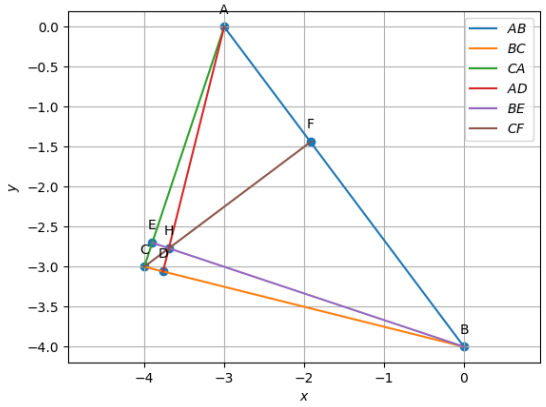
II. MEDIAN

Parameters	Values	Description
$\mathbf{D}$	$\begin{pmatrix}-2\\-\frac{7}{2}\end{pmatrix}$	$\frac{\mathbf{A+B}}{2}$
$\mathbf{E}$	$\begin{pmatrix}-\frac{7}{2}\\-\frac{3}{2}\end{pmatrix}$	$\frac{\mathbf{C+A}}{2}$
$\mathbf{F}$	$\begin{pmatrix}-\frac{3}{2}\\-2\end{pmatrix}$	$\frac{\mathbf{B+C}}{2}$
$\mathbf{m_4}$	$\begin{pmatrix}1\\-\frac{7}{2}\end{pmatrix}$	$\mathbf{D-A}$
$\mathbf{m_5}$	$\begin{pmatrix}-\frac{7}{2}\\\frac{5}{2}\end{pmatrix}$	$\mathbf{E-B}$
$\mathbf{m_6}$	$\begin{pmatrix}\frac{5}{2}\\1\end{pmatrix}$	$\mathbf{F-C}$
$\mathbf{n_4}$	$\begin{pmatrix}-\frac{7}{2}\\-1\end{pmatrix}$	$\begin{pmatrix}0&1\\-1&0\end{pmatrix}\mathbf{m_4}$
$\mathbf{n_5}$	$\begin{pmatrix}\frac{5}{2}\\\frac{7}{2}\end{pmatrix}$	$\begin{pmatrix}0&1\\-1&0\end{pmatrix}\mathbf{m_5}$
$\mathbf{n_6}$	$\begin{pmatrix}1\\-\frac{5}{2}\end{pmatrix}$	$\begin{pmatrix}0&1\\-1&0\end{pmatrix}\mathbf{m_6}$
$\mathbf{G}$	$\begin{pmatrix}-\frac{7}{3}\\-\frac{7}{3}\end{pmatrix}$	$\frac{\mathbf{A+B+C}}{3}$
$\|\mathbf{A-G}\|$	$\frac{\sqrt{53}}{3}$	centroid divides median in ratio 2:1
$\|\mathbf{D-G}\|$	$\frac{\sqrt{53}}{6}$	
$\|\mathbf{B-G}\|$	$\frac{\sqrt{74}}{3}$	
$\|\mathbf{E-G}\|$	$\frac{\sqrt{74}}{6}$	
$\|\mathbf{C-G}\|$	$\frac{\sqrt{29}}{3}$	
$\|\mathbf{F-G}\|$	$\frac{\sqrt{29}}{6}$	
$\text{rank}\begin{pmatrix}1&1&1\\\mathbf{A}&\mathbf{D}&\mathbf{G}\end{pmatrix}$	2	$\therefore$ points are collinear
$\text{rank}\begin{pmatrix}1&1&1\\\mathbf{B}&\mathbf{E}&\mathbf{G}\end{pmatrix}$		
$\text{rank}\begin{pmatrix}1&1&1\\\mathbf{C}&\mathbf{F}&\mathbf{G}\end{pmatrix}$		
AF	-3/2, 2	AFDE is a quad
ED		



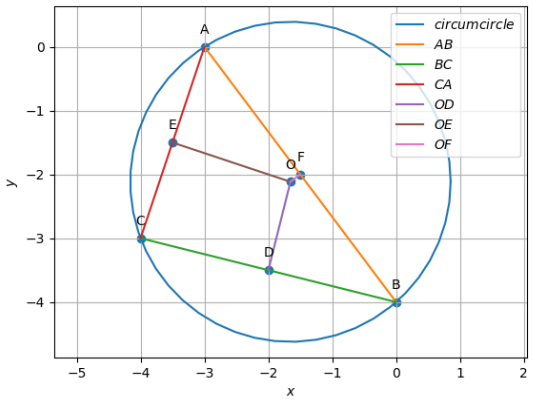
III. ALTITUDE

Parameters	Values	Description
$\mathbf{n_7}$	$\begin{pmatrix} -4 \\ 1 \end{pmatrix}$	alt AD_1
$\mathbf{n_8}$	$\begin{pmatrix} 1 \\ 3 \end{pmatrix}$	alt BE_1
$\mathbf{n_9}$	$\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	alt CF_1
$\mathbf{H}$	$\begin{pmatrix} -\frac{48}{13} \\ -\frac{36}{13} \end{pmatrix}$	orthocentre



IV. PERPENDICULAR BISECTOR

Parameters	Values	Description
$\mathbf{O}$	$\begin{pmatrix} -\frac{43}{26} \\ -\frac{55}{26} \end{pmatrix}$	circumcentre
$\|\mathbf{O}-\mathbf{A}\|$	2.5074	circumradius
$\|\mathbf{O}-\mathbf{B}\|$		
$\|\mathbf{O}-\mathbf{C}\|$		



V. ANGLE BISECTOR

Parameters	Values	Description
I – A	$\begin{pmatrix}-0.28\\1.74\end{pmatrix}$	angle bisector of A
I – B	$\begin{pmatrix}-1.57\\1.04\end{pmatrix}$	angle bisector of B
I – C	$\begin{pmatrix}-1.28\\-0.70\end{pmatrix}$	angle bisector of C
I	$\begin{pmatrix}-2.63\\-2.25\end{pmatrix}$	incentre
R_i	1.0581	incentre radius
$\angle BAI$	27.65°	bisector of A
$\angle CAI$		
$\angle ABI$	19.54°	bisector of B
$\angle CBI$		
$\angle BCI$	137.12°	bisector of C
$\angle ACI$		
$\mathbf{D_3}$	$\begin{pmatrix}-2.89\\-3.27\end{pmatrix}$	points of intersection
$\mathbf{E_3}$	$\begin{pmatrix}-1.78\\-1.61\end{pmatrix}$	
$\mathbf{F_3}$	$\begin{pmatrix}-2.89\\-3.27\end{pmatrix}$