Random vectors

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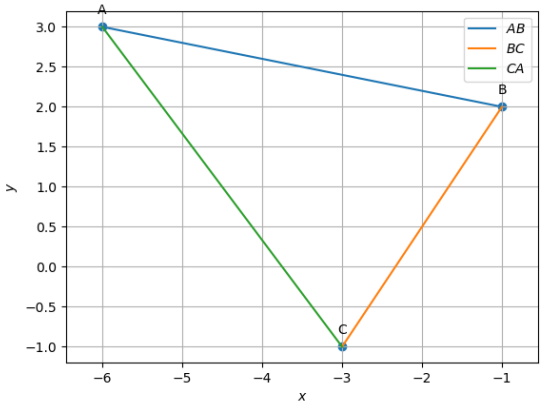
Random vectors are:
$\mathbf{A} = \begin{pmatrix} -6 \\ 3 \end{pmatrix}; \mathbf{B} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}; \mathbf{C} = \begin{pmatrix} -3 \\ -1 \end{pmatrix}$

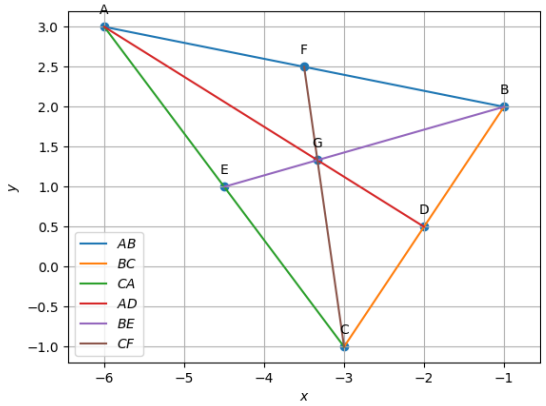


I. Vectors

Parameters	Values	Description
$\mathbf{m_1}$	$\begin{pmatrix} 5 \\ -1 \end{pmatrix}$	$\mathbf{B} - \mathbf{A}$
$\mathbf{m_2}$	$\begin{pmatrix} -2 \\ -3 \end{pmatrix}$	$\mathbf{C} - \mathbf{B}$
$\mathbf{m_3}$	$\begin{pmatrix} -3 \\ 4 \end{pmatrix}$	$\mathbf{A} - \mathbf{C}$
$\|\mathbf{B} - \mathbf{A}\|$	5.099	length of AB
$\|\mathbf{C} - \mathbf{B}\|$	3.6055	length of BC
$\|\mathbf{A} - \mathbf{C}\|$	5.0	length of CA
$\text{rank}\begin{pmatrix} 1 & 1 & 1 \\ \mathbf{A} & \mathbf{B} & \mathbf{C} \end{pmatrix}$	3	Non-collinear
$\mathbf{n_1}$	$\begin{pmatrix} -1 \\ -5 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}\mathbf{m_1}$
$\mathbf{n_2}$	$\begin{pmatrix} -3 \\ 2 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}\mathbf{m_2}$
$\mathbf{n_3}$	$\begin{pmatrix} 4 \\ 3 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}\mathbf{m_3}$
$\frac{1}{2}\|m_1 \times m_2\|$	8.5	Area
$\angle A$	41.82°	
$\angle B$	167.6198°	
$\angle C$	70.5599°	

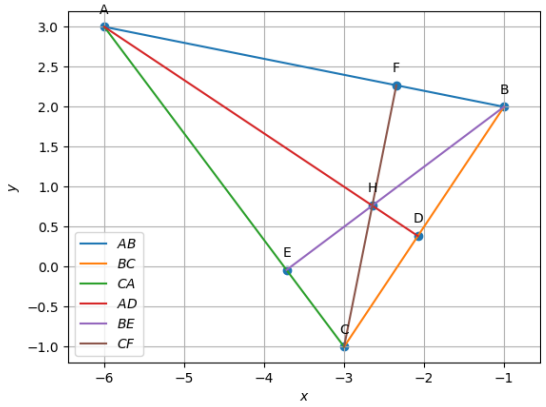
II. MEDIAN

Parameters	Values	Description
$\mathbf{D}$	$\begin{pmatrix}-2\\0.5\end{pmatrix}$	$\frac{\mathbf{A+B}}{2}$
$\mathbf{E}$	$\begin{pmatrix}-4.5\\1\end{pmatrix}$	$\frac{\mathbf{C+A}}{2}$
$\mathbf{F}$	$\begin{pmatrix}-3.5\\2.5\end{pmatrix}$	$\frac{\mathbf{B+C}}{2}$
$\mathbf{m_4}$	$\begin{pmatrix}4\\-2.5\end{pmatrix}$	$\mathbf{D-A}$
$\mathbf{m_5}$	$\begin{pmatrix}-3.5\\-1\end{pmatrix}$	$\mathbf{E-B}$
$\mathbf{m_6}$	$\begin{pmatrix}-0.5\\3.5\end{pmatrix}$	$\mathbf{F-C}$
$\mathbf{n_4}$	$\begin{pmatrix}-2.5\\-4\end{pmatrix}$	$\begin{pmatrix}0&1\\-1&0\end{pmatrix}\mathbf{m_4}$
$\mathbf{n_5}$	$\begin{pmatrix}-1\\3.5\end{pmatrix}$	$\begin{pmatrix}0&1\\-1&0\end{pmatrix}\mathbf{m_5}$
$\mathbf{n_6}$	$\begin{pmatrix}3.5\\0.5\end{pmatrix}$	$\begin{pmatrix}0&1\\-1&0\end{pmatrix}\mathbf{m_6}$
$\mathbf{G}$	$\begin{pmatrix}-3.33\\1.33\end{pmatrix}$	$\frac{\mathbf{A+B+C}}{3}$
$\|\mathbf{A-G}\|$	3.1446	$\frac{AG}{DG}=\frac{BG}{EG}=\frac{CG}{FG}=\frac{2}{1}$
$\|\mathbf{D-G}\|$	1.5723	
$\|\mathbf{B-G}\|$	2.4267	
$\|\mathbf{E-G}\|$	1.2133	
$\|\mathbf{C-G}\|$	2.3570	
$\|\mathbf{F-G}\|$	1.1785	
$\text{rank}\begin{pmatrix}1&1&1\\\mathbf{A}&\mathbf{D}&\mathbf{G}\end{pmatrix}$	2	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	-2.5,0.5	AFDE is a parallelogram
ED		



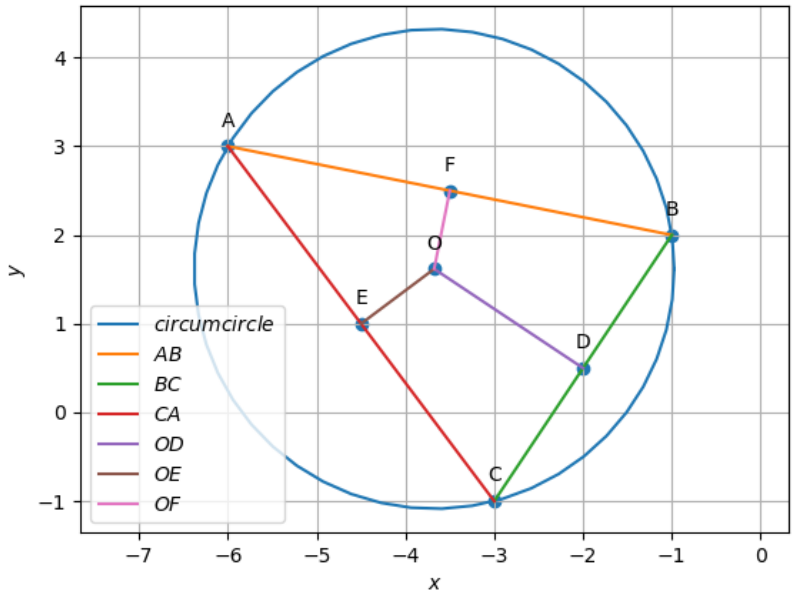
III. Altitude

Parameters	Values	Description
$\mathbf{p_1}$	$\begin{pmatrix}-2\\-3\end{pmatrix}$	alt AD_1
$\mathbf{p_2}$	$\begin{pmatrix}-3\\4\end{pmatrix}$	alt BE_1
$\mathbf{p_3}$	$\begin{pmatrix}5\\-1\end{pmatrix}$	alt CF_1
$\mathbf{H}$	$\begin{pmatrix}-2.6470\\0.7647\end{pmatrix}$	orthocentre



IV. Perpendicular Bisector

Parameters	Values	Description
O	$\begin{pmatrix} -3.6764 \\ 1.6176 \end{pmatrix}$	circumcentre
$\|\mathbf{O} - \mathbf{A}\|$	2.7036	circumradius
$\|\mathbf{O} - \mathbf{B}\|$		
$\|\mathbf{O} - \mathbf{C}\|$		



V. ANGLE BISECTOR

Parameters	Values	Description
I – A	$\begin{pmatrix}-1.5805\\0.9961\end{pmatrix}$	angle bisector of A
I – B	$\begin{pmatrix}-1.5352\\-0.6359\end{pmatrix}$	angle bisector of B
I – C	$\begin{pmatrix}0.0452\\-1.632\end{pmatrix}$	angle bisector of C
I	$\begin{pmatrix}-3.0595\\1.1468\end{pmatrix}$	incentre
R_i	1.2404	incentre radius
$\angle BAI$	20.91°	bisector of A
$\angle CAI$		
$\angle ABI$	146.19°	bisector of B
$\angle CBI$		
$\angle BCI$	144.72°	bisector of C
$\angle ACI$		
$\mathbf{D_3}$	$\begin{pmatrix}-2.0274\\0.4588\end{pmatrix}$	points of intersection
$\mathbf{E_3}$	$\begin{pmatrix}-4.0519\\0.4026\end{pmatrix}$	
$\mathbf{F_3}$	$\begin{pmatrix}-2.8163\\2.3632\end{pmatrix}$