

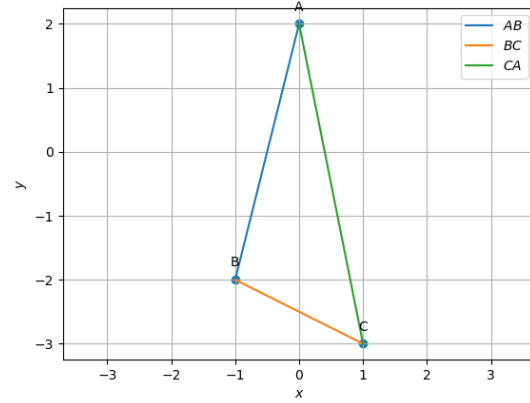
Random vectors

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Random vectors are:

$$\mathbf{A} = \begin{pmatrix} 0 \\ 2 \end{pmatrix}; \mathbf{B} = \begin{pmatrix} -1 \\ -2 \end{pmatrix}; \mathbf{C} = \begin{pmatrix} 1 \\ -3 \end{pmatrix}$$

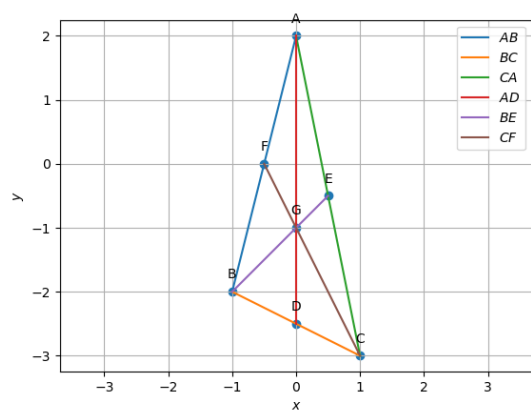
I. VECTORS



Parameters	Values	Description
\mathbf{m}_1	$\begin{pmatrix} -1 \\ -4 \end{pmatrix}$	$\mathbf{B} - \mathbf{A}$
\mathbf{m}_2	$\begin{pmatrix} 2 \\ -1 \end{pmatrix}$	$\mathbf{C} - \mathbf{B}$
\mathbf{m}_3	$\begin{pmatrix} -1 \\ 5 \end{pmatrix}$	$\mathbf{A} - \mathbf{C}$
$\ \mathbf{B} - \mathbf{A}\ $	4.1231	length of AB
$\ \mathbf{C} - \mathbf{B}\ $	2.236	length of BC
$\ \mathbf{A} - \mathbf{C}\ $	5.099	length of CA
$\text{rank}\begin{pmatrix} 1 & 1 & 1 \\ \mathbf{A} & \mathbf{B} & \mathbf{C} \end{pmatrix}$	3	Non-collinear
\mathbf{n}_1	$\begin{pmatrix} -4 \\ 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \mathbf{m}_1$
\mathbf{n}_2	$\begin{pmatrix} -1 \\ -2 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \mathbf{m}_2$
\mathbf{n}_3	$\begin{pmatrix} 5 \\ 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \mathbf{m}_3$
$\frac{1}{2} \ \mathbf{m}_1 \times \mathbf{m}_2\ $	4.5	Area
$\angle A$	25.3461°	
$\angle B$	102.5288°	
$\angle C$	52.125°	

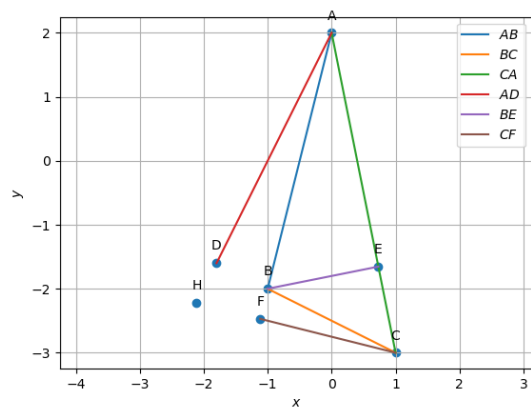
II. MEDIAN

Parameters	Values	Description
D	$\begin{pmatrix} 0 \\ -2.5 \end{pmatrix}$	$\frac{\mathbf{A}+\mathbf{B}}{2}$
E	$\begin{pmatrix} 0.5 \\ -0.5 \end{pmatrix}$	$\frac{\mathbf{C}+\mathbf{A}}{2}$
F	$\begin{pmatrix} -0.5 \\ 0 \end{pmatrix}$	$\frac{\mathbf{B}+\mathbf{C}}{2}$
m₄	$\begin{pmatrix} 0 \\ -4.5 \end{pmatrix}$	D – A
m₅	$\begin{pmatrix} 1.5 \\ 1.5 \end{pmatrix}$	E – B
m₆	$\begin{pmatrix} -1.5 \\ 3 \end{pmatrix}$	F – C
n₄	$\begin{pmatrix} -4.5 \\ 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \mathbf{m}_4$
n₅	$\begin{pmatrix} 1.5 \\ -1.5 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \mathbf{m}_5$
n₆	$\begin{pmatrix} 3 \\ 1.5 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \mathbf{m}_6$
G	$\begin{pmatrix} 0 \\ -1 \end{pmatrix}$	$\frac{\mathbf{A}+\mathbf{B}+\mathbf{C}}{3}$
$\ \mathbf{A} - \mathbf{G}\ $	3	$\frac{AG}{DG} = \frac{BG}{EG} = \frac{CG}{FG} = \frac{2}{1}$
$\ \mathbf{D} - \mathbf{G}\ $	1.5	
$\ \mathbf{B} - \mathbf{G}\ $	1.4142	
$\ \mathbf{E} - \mathbf{G}\ $	0.7071	
$\ \mathbf{C} - \mathbf{G}\ $	2.236	
$\ \mathbf{F} - \mathbf{G}\ $	1.118	
$\text{rank} \begin{pmatrix} 1 & 1 & 1 \\ \mathbf{A} & \mathbf{D} & \mathbf{G} \end{pmatrix}$	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	0.5, 2	AFDE is a parallelogram
ED		



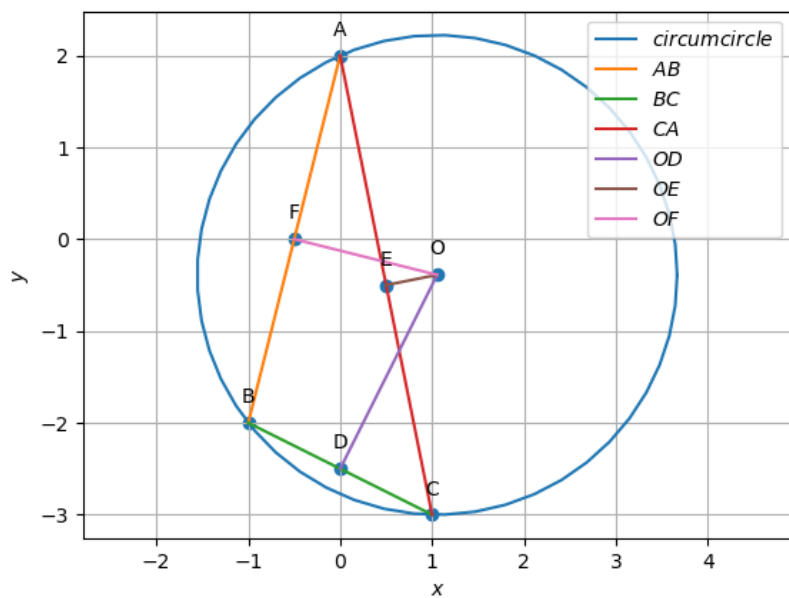
III. ALTITUDE

Parameters	Values	Description
\mathbf{p}_1	$\begin{pmatrix} 2 \\ -1 \end{pmatrix}$	alt AD_1
\mathbf{p}_2	$\begin{pmatrix} -1 \\ 5 \end{pmatrix}$	alt BE_1
\mathbf{p}_3	$\begin{pmatrix} -1 \\ -4 \end{pmatrix}$	alt CF_1
\mathbf{H}	$\begin{pmatrix} -2.111 \\ -2.222 \end{pmatrix}$	orthocentre



IV. PERPENDICULAR BISECTOR

Parameters	Values	Description
O	$\begin{pmatrix} 1.055 \\ -0.388 \end{pmatrix}$	circumcentre
$\ \mathbf{O} - \mathbf{A}\ $	2.6117	circumradius
$\ \mathbf{O} - \mathbf{B}\ $		
$\ \mathbf{O} - \mathbf{C}\ $		



V. ANGLE BISECTOR

Parameters	Values	Description
I – A	$\begin{pmatrix} 0.046 \\ 1.950 \end{pmatrix}$	angle bisector of A
I – B	$\begin{pmatrix} 1.137 \\ 0.523 \end{pmatrix}$	angle bisector of B
I – C	$\begin{pmatrix} 1.09 \\ -1.427 \end{pmatrix}$	angle bisector of C
I	$\begin{pmatrix} -0.0851 \\ -1.579 \end{pmatrix}$	incentre
R_i	0.7854	incentre radius
$\angle BAI$	12.673°	bisector of A
$\angle CAI$		
$\angle ABI$	128.735°	bisector of B
$\angle CBI$		
$\angle BCI$	153.937°	bisector of C
$\angle ACI$		
D₃	$\begin{pmatrix} -0.4364 \\ -2.2817 \end{pmatrix}$	points of intersection
E₃	$\begin{pmatrix} 0.685 \\ -1.4251 \end{pmatrix}$	
F₃	$\begin{pmatrix} -0.8471 \\ -2.2817 \end{pmatrix}$	

