Random Vector Assignment

EE22BTECH11052 - Sujal Gupta

The randomly generated vectors are:

$$\mathbf{A} = \begin{pmatrix} -6 \\ 0 \end{pmatrix} \tag{1}$$

$$\mathbf{B} = \begin{pmatrix} -4 \\ 3 \end{pmatrix} \tag{2}$$

$$\mathbf{C} = \begin{pmatrix} -2 \\ 0 \end{pmatrix} \tag{3}$$

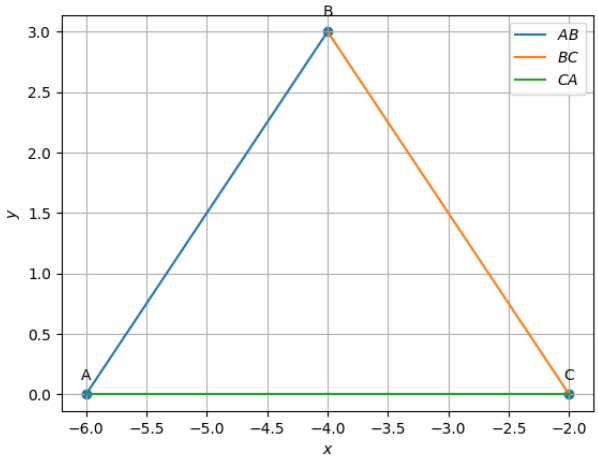

Fig. 0. 1-1

I. VECTORS

parameter	value	description
$\mathbf{m_1}$	$\begin{pmatrix}2\\3\end{pmatrix}$	AB
$\mathbf{m_2}$	$\begin{pmatrix}2\\-3\end{pmatrix}$	BC
$\mathbf{m_3}$	$\begin{pmatrix}-4\\0\end{pmatrix}$	CA
$\|\mathbf{B}-\mathbf{C}\|$	$\begin{pmatrix}3.60\end{pmatrix}$	length of BC
$\mathbf{A}, \mathbf{B}, \mathbf{C}$ collinearity	collinear	collinear
$\mathbf{n^T}$	$\begin{pmatrix}-3\\2\end{pmatrix}$	AB
c	18	
$\mathbf{n^T}$	$\begin{pmatrix}3\\2\end{pmatrix}$	BC
c	-6	
$\mathbf{n^T}$	$\begin{pmatrix}0\\-4\end{pmatrix}$	AC
c	-12	
Area	6	area of triangle
$\angle A$	56.30°	Angle
$\angle B$	67.38	
$\angle C$	56.30	

TABLE 0
VECTORS

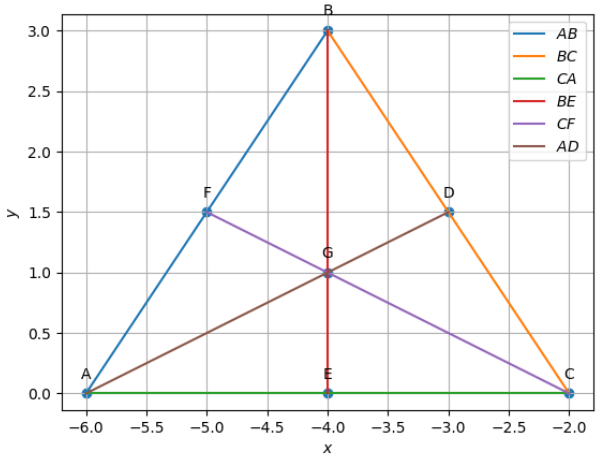

Fig. 0. 1-2

II. MEDIAN

parameter	value	description
D	$\begin{pmatrix}-3\\1.5\end{pmatrix}$	midpoint of AB
E	$\begin{pmatrix}-4\\0\end{pmatrix}$	midpoint of BC
F	$\begin{pmatrix}-5\\1.5\end{pmatrix}$	midpoint of CA
$\mathbf{n^T}$	$\begin{pmatrix}-1.5 & 3\end{pmatrix}$	normal eq of AD
c	15	
$\mathbf{n^T}$	$\begin{pmatrix}3 & 0\end{pmatrix}$	normal eq of BE
c	-12	
$\mathbf{n^T}$	$\begin{pmatrix}-1.5 & -3\end{pmatrix}$	normal eq of CF
c	-3	
G	$\begin{pmatrix}-4\\1\end{pmatrix}$	intersection of BE and CF
collinearity	collinear	A, G, D are collinear
G	$\begin{pmatrix}-4\\1\end{pmatrix}$	centroid

TABLE 0
MEDIAN

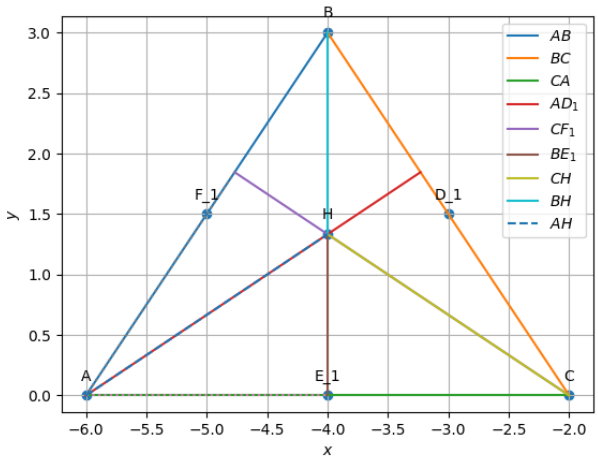

Fig. 0. 1-3

III. ALTITUDE

parameter	value	description
$\mathbf{n^T}$	$\begin{pmatrix}-1.84 & 2.76\end{pmatrix}$	AD_1
c	15.69	
$\mathbf{n^T}$	$\begin{pmatrix}3 & 0\end{pmatrix}$	BE_1
c	-12	
$\mathbf{n^T}$	$\begin{pmatrix}-1.84 & -2.76\end{pmatrix}$	CF_1
c	-0.92	
H	$\begin{pmatrix}-4\\1.33\end{pmatrix}$	Orthocentre

TABLE 0
ALTITUDE

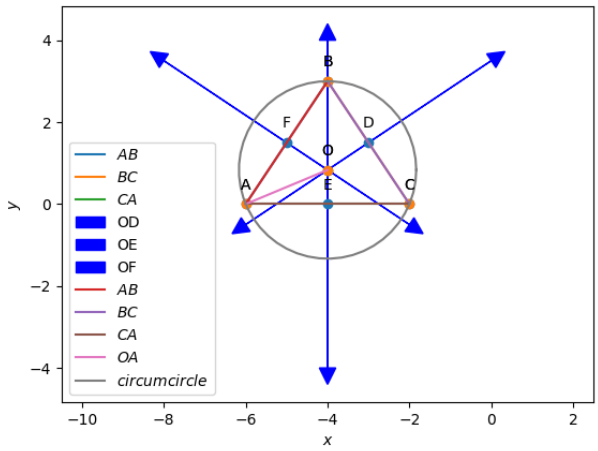

Fig. 0. 1-4

IV. PERPENDICULAR BISECTORS

parameter	value	description
$\mathbf{n}^T$	$\begin{pmatrix}-2 & -3\end{pmatrix}$	Perpendicular bisector of AB
c	5.50	
$\mathbf{n}^T$	$\begin{pmatrix}-2 & 3\end{pmatrix}$	Perpendicular bisector of BC
c	10.5	
$\mathbf{n}^T$	$\begin{pmatrix}4 & 0\end{pmatrix}$	Perpendicular bisector of CA
c	-16	
$\mathbf{O}$	$\begin{pmatrix}-4 \\ 0.833\end{pmatrix}$	Circumcentre
r_c	2.166	$OA = OB = OC$
$\angle BOC$	112.6°	Angle BOC
$\angle BAC$	56.3°	Angle BAC

TABLE 0
PERPENDICULAR BISECTORS

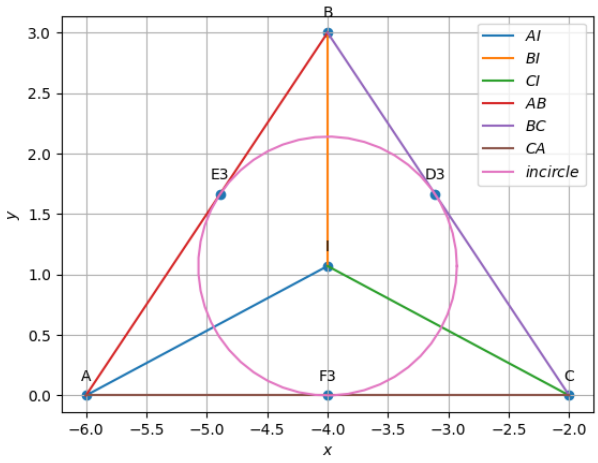

Fig. 0. 1-5

V. ANGLE BISECTORS

parameter	value	description
$\mathbf{n^T}$	$\begin{pmatrix}0.83 & -1.55\end{pmatrix}$	Angular bisector of A
c	-4.99	
$\mathbf{n^T}$	$\begin{pmatrix}0 & -1.10\end{pmatrix}$	Angular bisector of B
c	-3.32	
$\mathbf{n^T}$	$\begin{pmatrix}0.83 & -0.44\end{pmatrix}$	Angular bisector of C
c	-1.66	
I	$\begin{pmatrix}-4\\1.07\end{pmatrix}$	Incentre
r_i	1.07	Inradius
$\angle BAI$	28.154°	Angle BAI
$\angle CAI$	28.154°	Angle CAI
r_{AB}, r_{BC}, r_{CA}	1.070	$r_{AB} = r_{BC} = r_{CA}$
$\mathbf{D_3}$	$\begin{pmatrix}-3.10\\1.66\end{pmatrix}$	D_3
$\mathbf{E_3}$	$\begin{pmatrix}-4.89\\1.66\end{pmatrix}$	E_3
$\mathbf{F_3}$	$\begin{pmatrix}-4\\0\end{pmatrix}$	F_3
length AE_3, AF_3	2	$AE_3 = AF_3$
length BD_3, BF_3	1.606	$BD_3 = BF_3$
length CD_3, CE_3	2	$CD_3 = CE_3$

TABLE 0
ANGLE BISECTORS