Random Vector Assignment

EE22BTECH11052 - Sujal Gupta

The randomly generated vectors are:

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

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

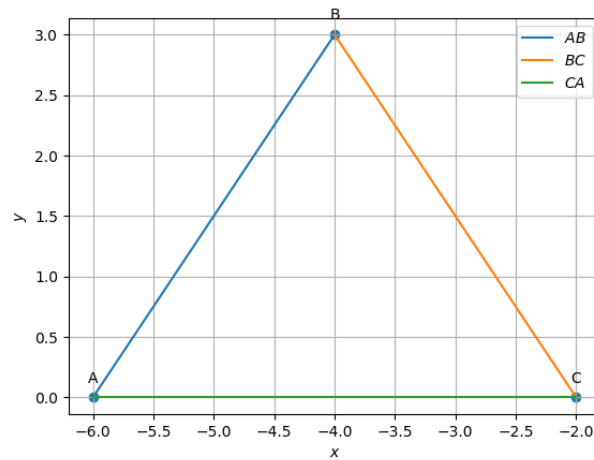$$\mathbf{C} = \begin{pmatrix} -2 \\ 0 \end{pmatrix} \tag{3}$$

Fig. 0. Vectors

I. Vectors

parameter	value	description
A	$\begin{pmatrix} -6 \\ 0 \end{pmatrix}$	vector **A**
B	$\begin{pmatrix} -4 \\ 3 \end{pmatrix}$	vector **B**
C	$\begin{pmatrix} -2 \\ 0 \end{pmatrix}$	vector **C**
$\mathbf{m_1}$	$\begin{pmatrix} 2 \\ 3 \end{pmatrix}$	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
rank $\begin{pmatrix} 1 & 1 & 1 \\ A & B & C \end{pmatrix}$	3	non-collinear
$\mathbf{n_1}^{\mathbf{T}}$	$\begin{pmatrix} -3 \\ 2 \end{pmatrix}$	AB
c_1	18	
$\mathbf{n_2}^{\mathbf{T}}$	$\begin{pmatrix} 3 \\ 2 \end{pmatrix}$	BC
c_2	-6	
$\mathbf{n_3}^{\mathbf{T}}$	$\begin{pmatrix} 0 \\ -4 \end{pmatrix}$	AC
c_3	-12	
Area	6	area of triangle
$\angle A$	56.30°	
$\angle B$	67.38	Angle
$\angle C$	56.30	

TABLE 0

Vectors
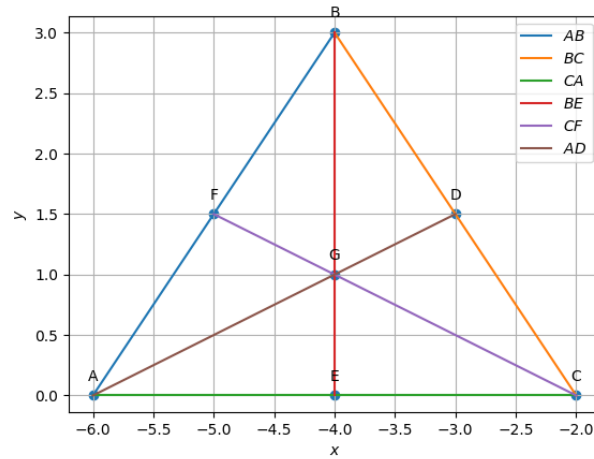
Fig. 0. Medians

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
$\mathbf{n_4}^T$	$\begin{pmatrix} -1.5 & 3 \end{pmatrix}$	normal eq of AD
c_4	15	
$\mathbf{n_5}^T$	$\begin{pmatrix} 3 & 0 \end{pmatrix}$	normal eq of BE
c_5	-12	
$\mathbf{n_6}^T$	$\begin{pmatrix} -1.5 & -3 \end{pmatrix}$	normal eq of CF
c_6	-3	
G	$\begin{pmatrix} -4 \\ 1 \end{pmatrix}$	intersection of BE and CF
collinearity	collinear	$\mathbf{A}, \mathbf{G}, \mathbf{D}$ are collinear
G	$\begin{pmatrix} -4 \\ 1 \end{pmatrix}$	centroid

TABLE 0
MEDIAN
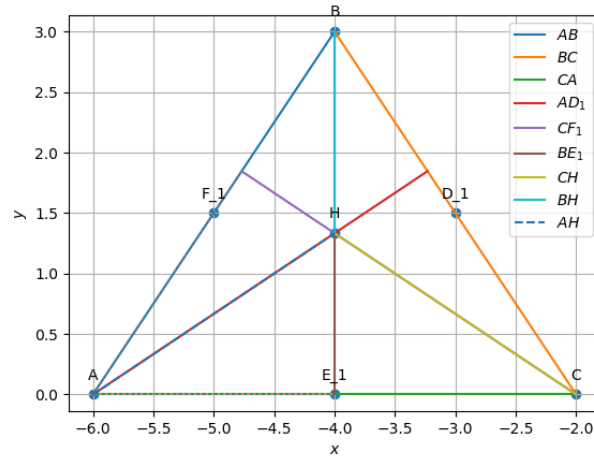
Fig. 0. Altitude

III. ALTITUDE

parameter	value	description
$\mathbf{D_1}$	$\begin{pmatrix} -3.23 \\ 1.84 \end{pmatrix}$	altitude foot from $\mathbf{A}$
$\mathbf{E_1}$	$\begin{pmatrix} -4 \\ 0 \end{pmatrix}$	altitude foot from $\mathbf{B}$
$\mathbf{F_1}$	$\begin{pmatrix} -4.79 \\ 1.84 \end{pmatrix}$	altitude foot from $\mathbf{C}$
$\mathbf{n_7}^T$	$\begin{pmatrix} -1.84 & 2.76 \end{pmatrix}$	AD_1
c_7	15.69	
$\mathbf{n_8}^T$	$\begin{pmatrix} 3 & 0 \end{pmatrix}$	BE_1
c_8	-12	
$\mathbf{n_9}^T$	$\begin{pmatrix} -1.84 & -2.76 \end{pmatrix}$	CF_1
c_9	-0.92	
$\mathbf{H}$	$\begin{pmatrix} -4 \\ 1.33 \end{pmatrix}$	Orthocentre

TABLE 0
ALTITUDE
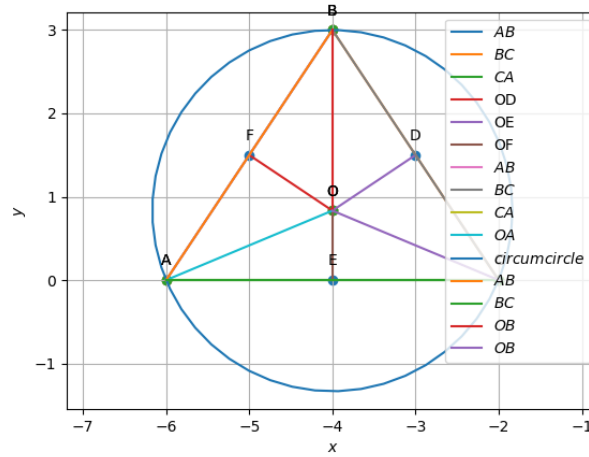
Fig. 0. PERPENDICULAR BISECTORS

IV. PERPENDICULAR BISECTORS

parameter	value	description
$\mathbf{n_{10}}^T$	$\begin{pmatrix} -2 & -3 \end{pmatrix}$	Perpendicular bisector of AB
c_{10}	5.50	
$\mathbf{n_{11}}^T$	$\begin{pmatrix} -2 & 3 \end{pmatrix}$	Perpendicular bisector of BC
c_{11}	10.5	
$\mathbf{n_{12}}^T$	$\begin{pmatrix} 4 & 0 \end{pmatrix}$	Perpendicular bisector of CA
c_{12}	-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
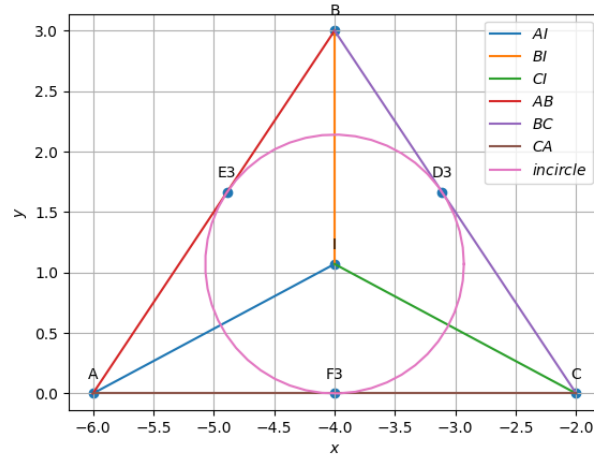
Fig. 0. ANGLE BISECTORS

V. ANGLE BISECTORS

parameter	value	description
$\mathbf{n_{13}}^T$	$\begin{pmatrix} 0.83 & -1.55 \end{pmatrix}$	Angular bisector of $\mathbf{A}$
c_{13}	-4.99	
$\mathbf{n_{14}}^T$	$\begin{pmatrix} 0 & -1.10 \end{pmatrix}$	Angular bisector of $\mathbf{B}$
c_{14}	-3.32	
$\mathbf{n_{15}}^T$	$\begin{pmatrix} 0.83 & -0.44 \end{pmatrix}$	Angular bisector of $\mathbf{C}$
c_{15}	-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	$r_{AB} = r_{BC} = r_{CA}$
$\mathbf{D_3}$	$\begin{pmatrix} -3.10 \\ 1.66 \end{pmatrix}$	$\mathbf{D_3}$
$\mathbf{E_3}$	$\begin{pmatrix} -4.89 \\ 1.66 \end{pmatrix}$	$\mathbf{E_3}$
$\mathbf{F_3}$	$\begin{pmatrix} -4 \\ 0 \end{pmatrix}$	$\mathbf{F_3}$
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