

Random Vector Assignment

EE22BTECH11052 - Sujal Gupta

The randomly generated vectors are:

$$\mathbf{A} = \begin{pmatrix} -6 \\ 0 \end{pmatrix} \quad (1)$$

$$\mathbf{B} = \begin{pmatrix} -4 \\ 3 \end{pmatrix} \quad (2)$$

$$\mathbf{C} = \begin{pmatrix} -2 \\ 0 \end{pmatrix} \quad (3)$$

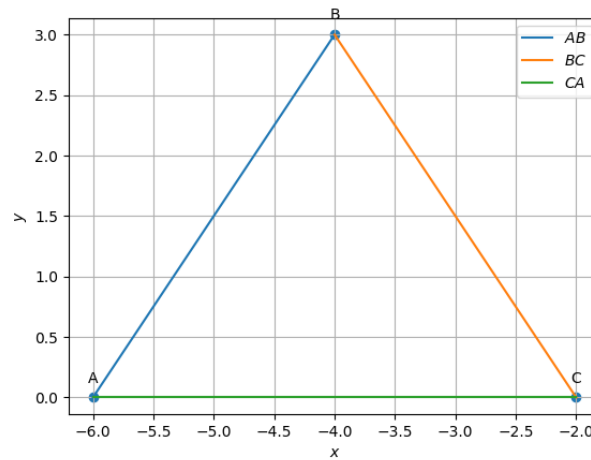


Fig. 0. Vectors

I. VECTORS

parameter	value	description
A	$\begin{pmatrix} -6 \\ 0 \end{pmatrix}$	vector <i>A</i>
B	$\begin{pmatrix} -4 \\ 3 \end{pmatrix}$	vector <i>B</i>
C	$\begin{pmatrix} -2 \\ 0 \end{pmatrix}$	vector <i>C</i>
m₁	$\begin{pmatrix} 2 \\ 3 \end{pmatrix}$	<i>AB</i>
m₂	$\begin{pmatrix} 2 \\ -3 \end{pmatrix}$	<i>BC</i>
m₃	$\begin{pmatrix} -4 \\ 0 \end{pmatrix}$	<i>CA</i>
 B – C 	(3.60)	length of <i>BC</i>
A, B, C collinearity	collinear	collinear
n^T	$\begin{pmatrix} -3 \\ 2 \end{pmatrix}$	AB
c	18	
n^T	$\begin{pmatrix} 3 \\ 2 \end{pmatrix}$	BC
c	-6	
n^T	$\begin{pmatrix} 0 \\ -4 \end{pmatrix}$	AC
c	-12	
Area	6	area of triangle
∠A	56.30°	Angle
∠B	67.38	
∠C	56.30	

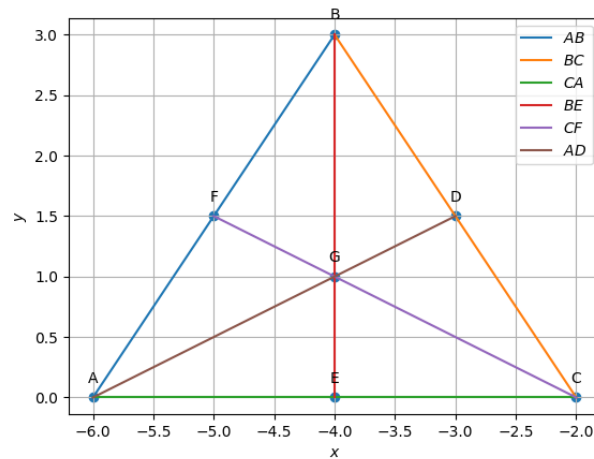
TABLE 0
VECTORS

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}^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

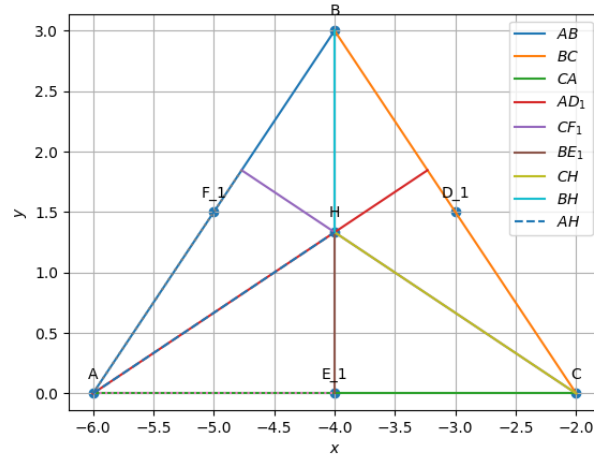


Fig. 0. Altitude

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

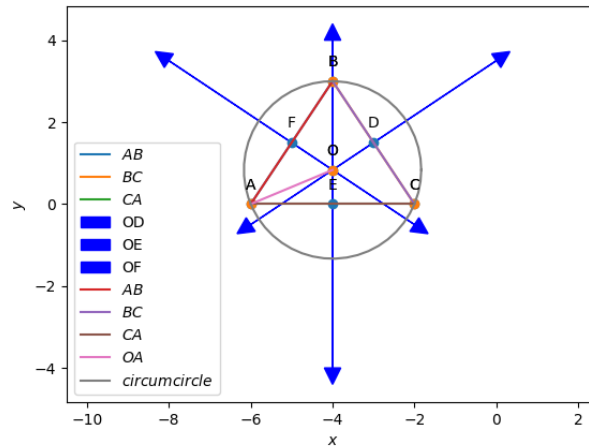


Fig. 0. PERPENDICULAR BISECTORS

IV. PERPENDICULAR BISECTORS

parameter	value	description
\mathbf{n}^T	$(-2 \quad -3)$	Perpendicular bisector of AB
c	5.50	
\mathbf{n}^T	$(-2 \quad 3)$	Perpendicular bisector of BC
c	10.5	
\mathbf{n}^T	$(4 \quad 0)$	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

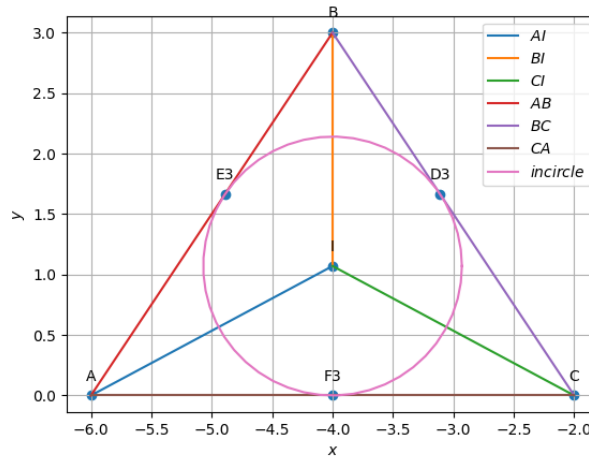
TABLE 0
PERPENDICULAR BISECTORS

Fig. 0. ANGLE BISECTORS

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