Answer Key Table

Aryan Jain - EE22BTECH11011*

Consider the vertices,

$$\mathbf{A} = \begin{pmatrix} -6 \\ -3 \end{pmatrix} \tag{1}$$

$$\mathbf{B} = \begin{pmatrix} -1 \\ 0 \end{pmatrix} \tag{2}$$

$$\mathbf{C} = \begin{pmatrix} 3 \\ -5 \end{pmatrix} \tag{3}$$

I. VECTORS

parameter	value	description
$\mathbf{m_1}$	$\begin{pmatrix} 5 \\ 3 \end{pmatrix}$	direction vector of line AB
$\mathbf{m_2}$	$\begin{pmatrix} 4 \\ -5 \end{pmatrix}$	direction vector of line BC
$\mathbf{m_3}$	$\begin{pmatrix} -9 \\ 2 \end{pmatrix}$	direction vector of line AC
$\|\mathbf{B}-\mathbf{A}\|$	5.83	lenght of line AB
$\|\mathbf{C}-\mathbf{B}\|$	6.40	lenght of line BC
$\|\mathbf{A}-\mathbf{C}\|$	9.21	lenght of line AC
rank	3	points are not collinear
$\mathbf{n_1}^\top$	$\begin{pmatrix} 3 & -5 \end{pmatrix}$	normal vector of line AB
c_1	-3	constant of line AB
$\mathbf{n_2}^\top$	$\begin{pmatrix} -5 & -4 \end{pmatrix}$	normal vector of line BC
c_2	5	constant of line BC
$\mathbf{n_3}^\top$	$\begin{pmatrix} 2 & 9 \end{pmatrix}$	normal vector of line AC
c_3	-39	constant of line AC
area	18.5	area of triangle
$\angle A$	43.49°	Angle
$\angle B$	97.69°	
$\angle C$	38.81°	

TABLE I.1
VECTORS

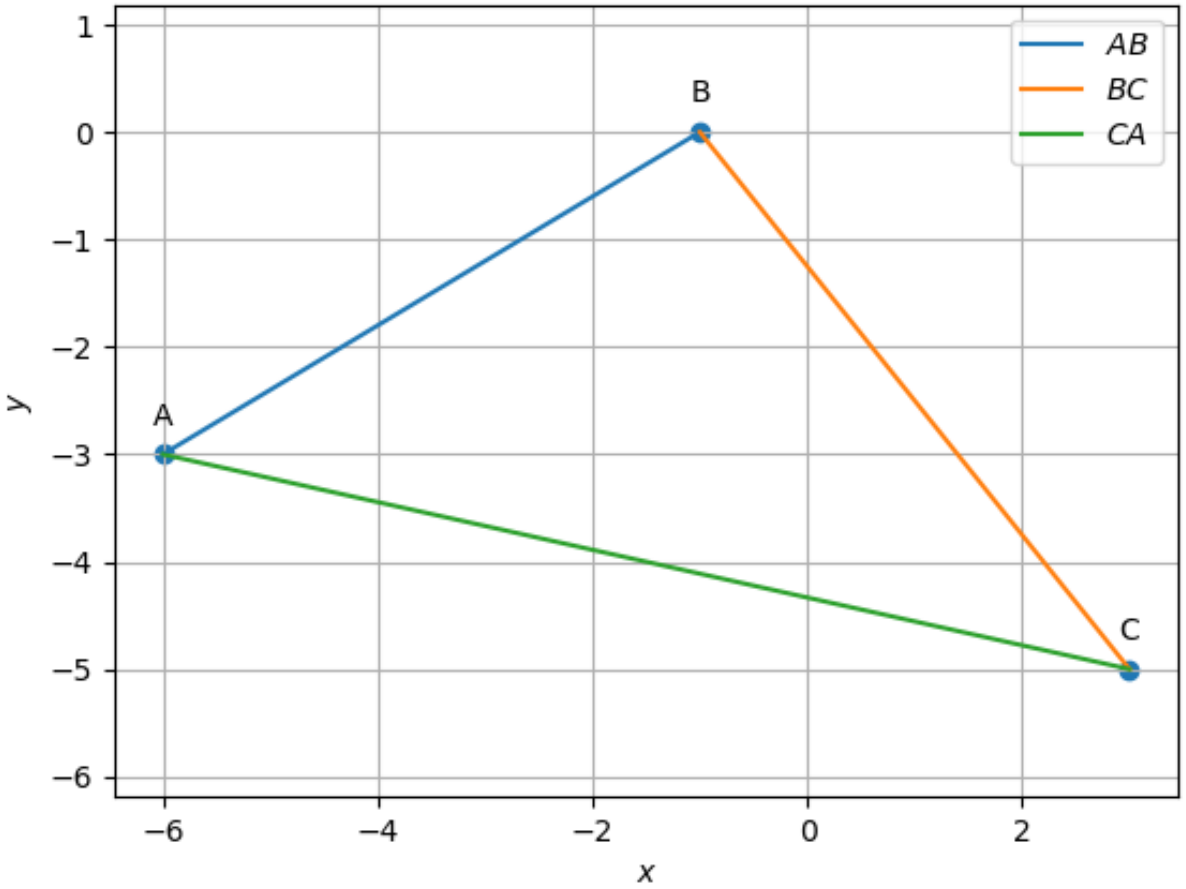

Fig. I.1. Triangle ABC

II. MEDIANS

parameter	value	description
D	$\begin{pmatrix} 1 \\ -2.5 \end{pmatrix}$	midpoint of line BC
E	$\begin{pmatrix} -1.5 \\ -4 \end{pmatrix}$	midpoint of line AC
F	$\begin{pmatrix} -3.5 \\ -1.5 \end{pmatrix}$	midpoint of line AB
$\mathbf{n_4^\top}$	$\begin{pmatrix} 0.5 & -7 \end{pmatrix}$	normal vector of line AD
c_4	18	constant of line AD
$\mathbf{n_5^\top}$	$\begin{pmatrix} -4 & 0.5 \end{pmatrix}$	normal vector of line BE
c_5	4	constant of line BE
$\mathbf{n_6^\top}$	$\begin{pmatrix} 3.5 & 6.5 \end{pmatrix}$	normal vector of line CF
c_4	-22	constant of line CF
G	$\begin{pmatrix} -1.33 \\ -2.66 \end{pmatrix}$	centroid of triangle

TABLE II.1
MEDIANS

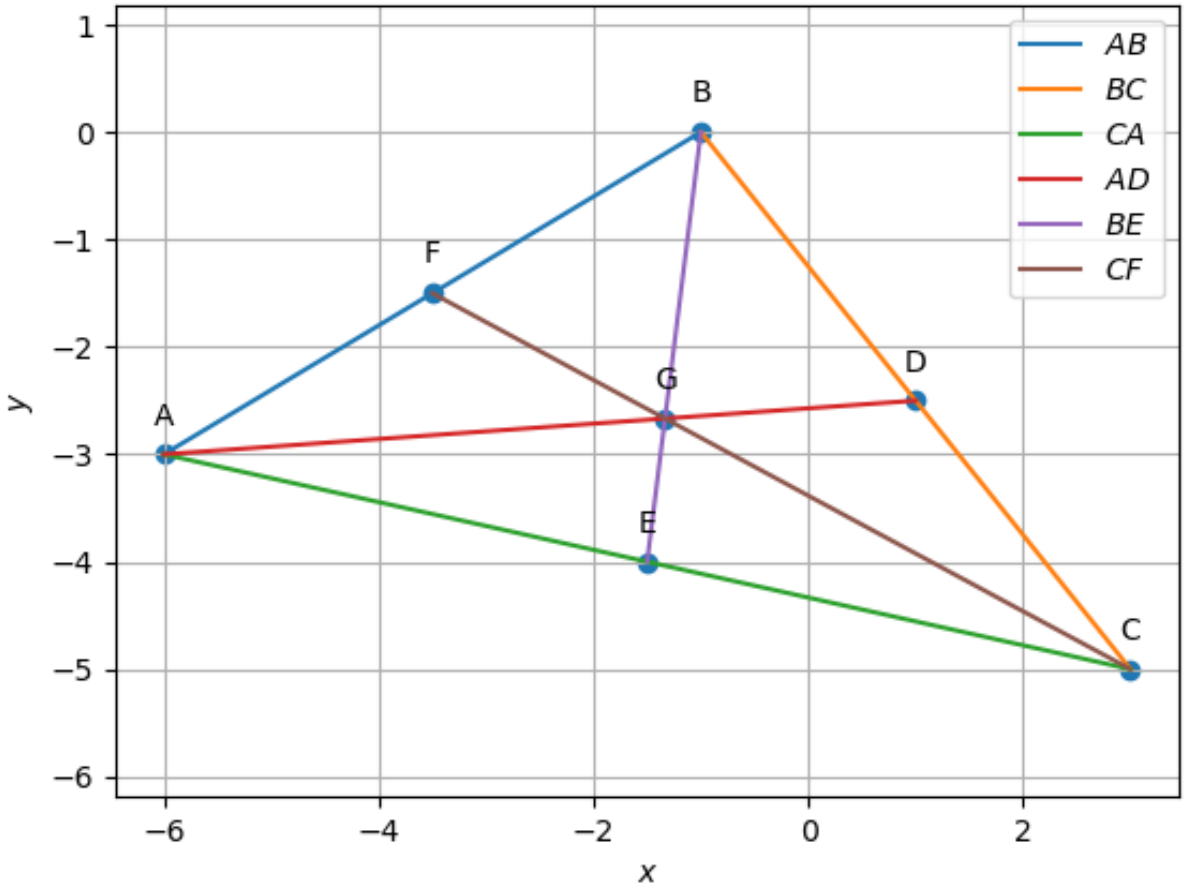

Fig. II.1. Triangle ABC with medians AD, BE and CF

III. ALTITUDES

parameter	value	description
$\mathbf{n_7}^\top$	$\begin{pmatrix}4 & -5\end{pmatrix}$	normal vector of line AD_1
c_7	-9	constant of line AD_1
$\mathbf{n_8}^\top$	$\begin{pmatrix}-9 & 2\end{pmatrix}$	normal vector of line BE_1
c_8	9	constant of line BE_1
$\mathbf{n_9}^\top$	$\begin{pmatrix}5 & 3\end{pmatrix}$	normal vector of line CF_1
c_7	0	constant of line CF_1
$\mathbf{H}$	$\begin{pmatrix}-0.73 \\ 1.21\end{pmatrix}$	orthocentre of triangle

TABLE III.1
ALTITUDES

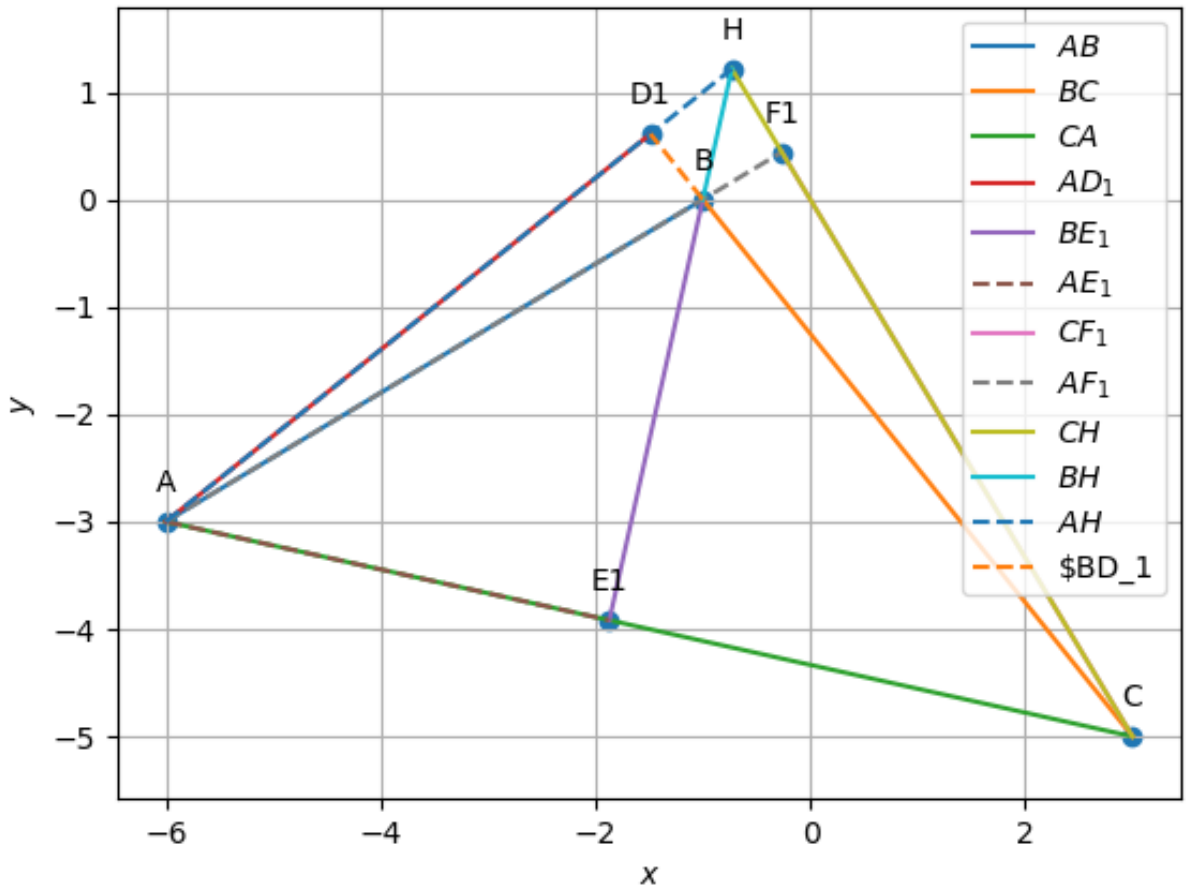

Fig. III.1. Triangle ABC with altitudes AD_1, BE_1 and CF_1

IV. PERPENDICULAR BISECTOR

parameter	value	description
$\mathbf{n}_{10}^{\top}$	$\begin{pmatrix}-5 & -3\end{pmatrix}$	normal vetor of Perpendicular bisector of AB
c_{10}	22	constant of Perpendicular bisector of AB
$\mathbf{n}_{11}^{\top}$	$\begin{pmatrix}-4 & 5\end{pmatrix}$	normal vector of Perpendicular bisector of BC
c_{11}	-16.5	constant of Perpendicular bisector of BC
$\mathbf{n}_{12}^{\top}$	$\begin{pmatrix}9 & -2\end{pmatrix}$	normal vector of Perpendicular bisector of CA
c_{12}	-5.5	constant of Perpendicular bisector of AC
O	$\begin{pmatrix}-1.63\\-4.60\end{pmatrix}$	Circumcircle
radius	4.65	

TABLE IV.1
PERPENDICULAR BISECTORS

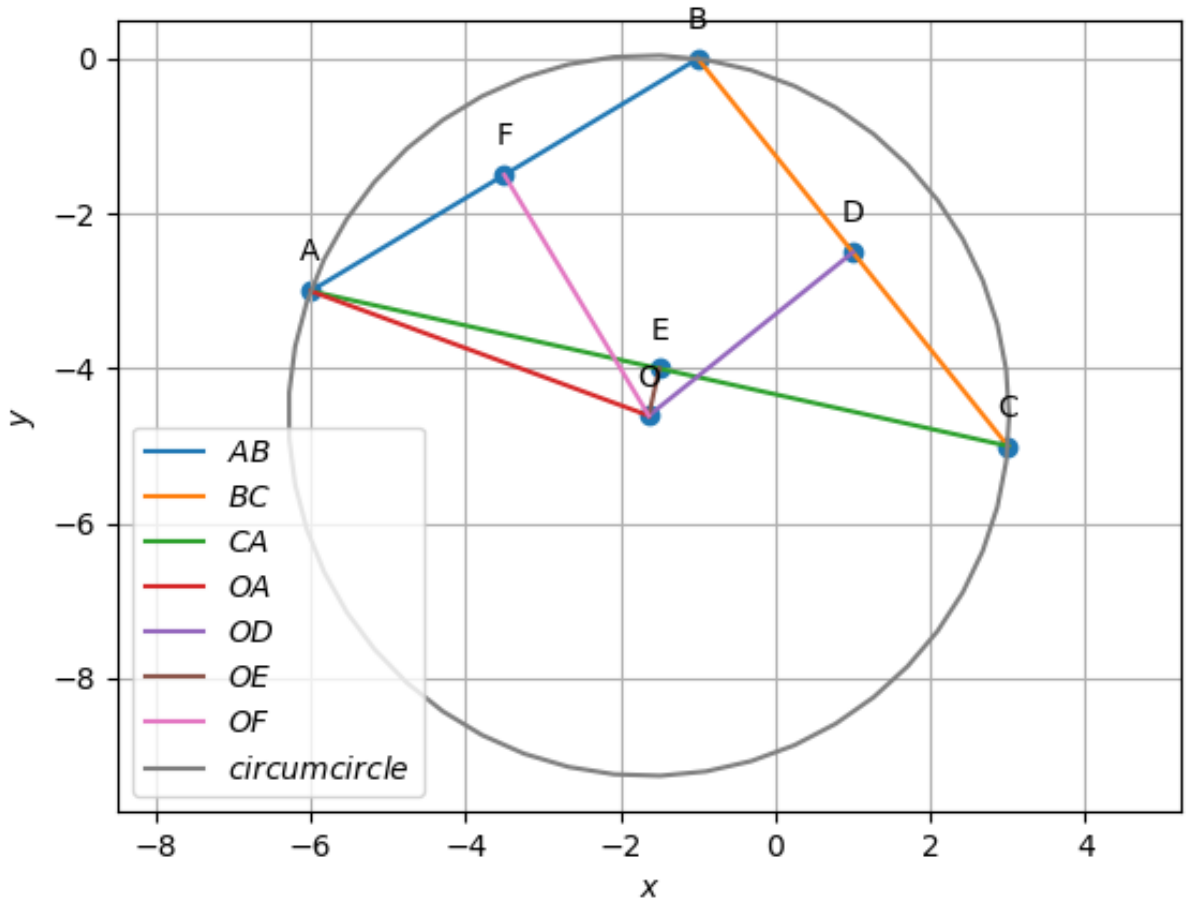

Fig. IV.1. circumcircle of triangle ABC with circumcentre O

V. ANGULAR BISECTOR

parameter	value	description
$\mathbf{n_{13}^\top}$	$\begin{pmatrix}0.29 & -1.83\end{pmatrix}$	normal vector of Angular bisector of $\angle A$
c_{13}	3.71	constant of Angular bisector of $\angle A$
$\mathbf{n_{14}^\top}$	$\begin{pmatrix}-1.29 & 0.23\end{pmatrix}$	normal vector of Angular bisector of $\angle B$
c_{14}	1.29	constant of Angular bisector of $\angle B$
$\mathbf{n_{15}^\top}$	$\begin{pmatrix}0.99 & 1.60\end{pmatrix}$	normal vector of Angular bisector of $\angle C$
c_{15}	-10.78	constant of Angular bisector of $\angle C$
I	$\begin{pmatrix}-1.40\\-2.25\end{pmatrix}$	Incircle
radius	1.72	
$\mathbf{D_3}$	$\begin{pmatrix}-0.05\\-1.17\end{pmatrix}$	points of contact of incircle
$\mathbf{E_3}$	$\begin{pmatrix}-2.29\\-0.77\end{pmatrix}$	
$\mathbf{F_3}$	$\begin{pmatrix}-1.77\\-3.93\end{pmatrix}$	

TABLE V.1
ANGULAR BISECTORS

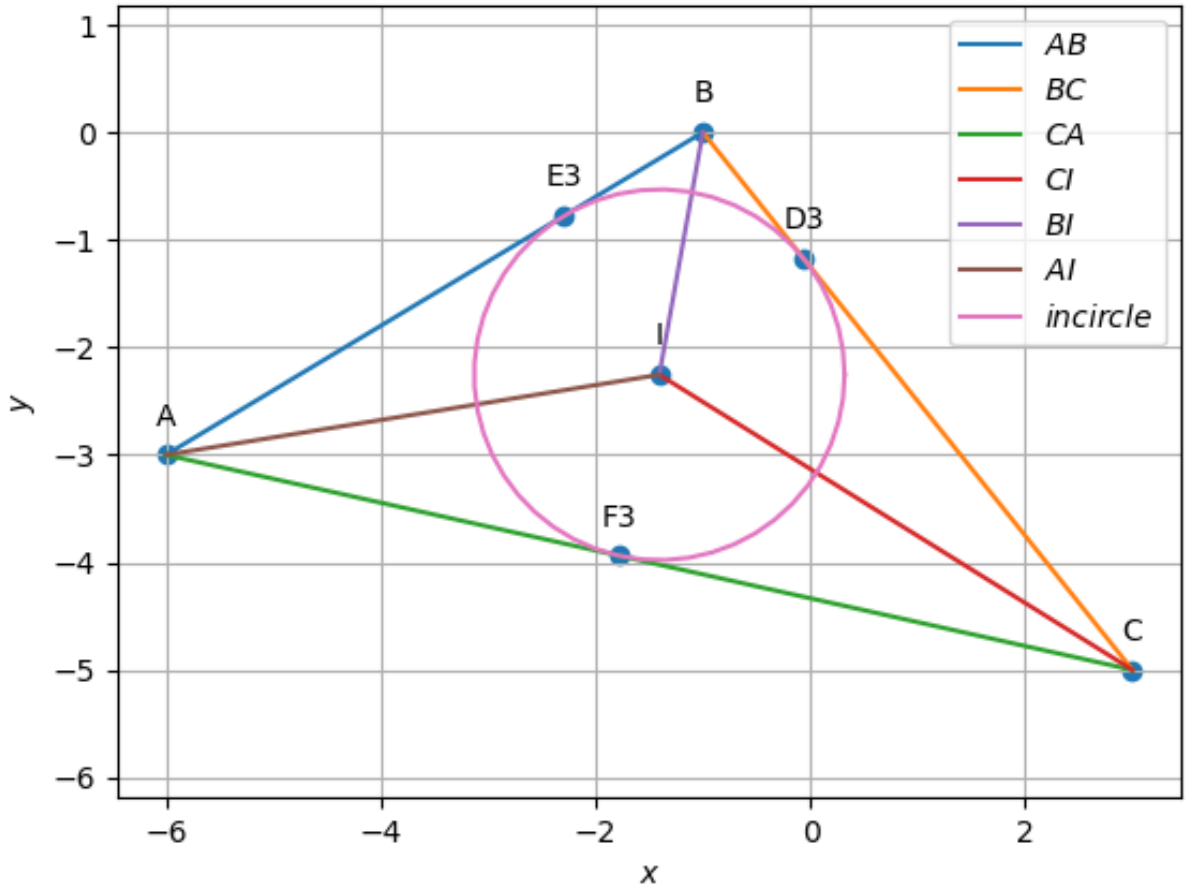

Fig. V.1. incircle of triangle ABC with incentre I