Assignment
TRIANGLES

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EE22BTECH11042

I. Vectors

Consider a triangle with vertices

$$\mathbf{A} = \begin{pmatrix} -3 \\ -1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$$

parameter	values	description
$\mathbf{m_1}$	$\begin{pmatrix} 8 \\ 0 \end{pmatrix}$	Direction vector of AB
$\mathbf{m_2}$	$\begin{pmatrix} -7 \\ 4 \end{pmatrix}$	Direction vector of BC
$\mathbf{m_3}$	$\begin{pmatrix} -1 \\ -4 \end{pmatrix}$	Direction vector of CA
$\|\mathbf{BC}\|$	8.06	lenght of BC
rank	3	non collinear
$\mathbf{n}$	$\begin{pmatrix} 4 \\ 7 \end{pmatrix}$	BC
c	13	
Area	16	Area of triangle
$\angle A$	75.96°	
$\angle B$	29.74°	Angle
$\angle C$	74.29°	

TABLE I.1
Vector
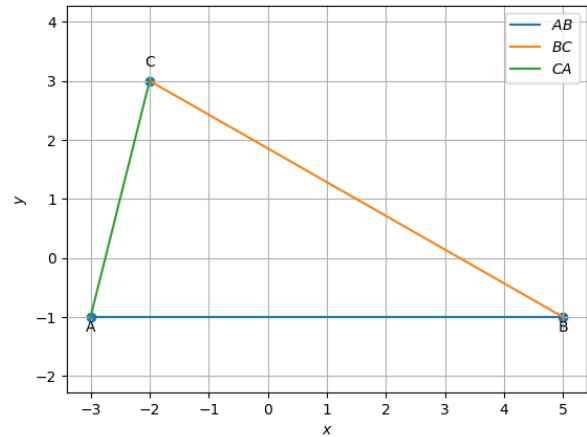
Fig. I.1. Plot of triangle ABC
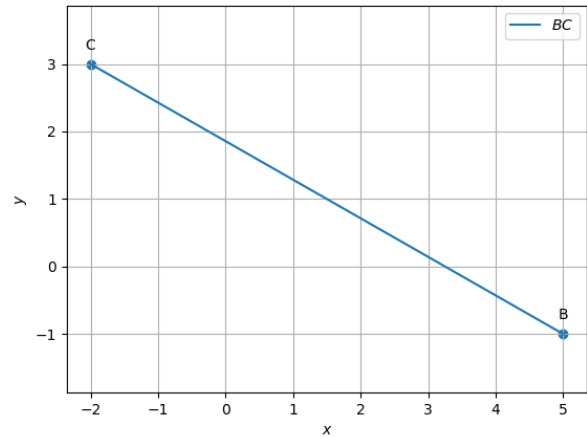
II. Median

parameter	values	description
D	$\begin{pmatrix} 1.5 \\ 1 \end{pmatrix}$	mid-point of BC
E	$\begin{pmatrix} -2.5 \\ 1 \end{pmatrix}$	mid-point of CA
F	$\begin{pmatrix} 1 \\ -1 \end{pmatrix}$	mid-point of AC
G	$\begin{pmatrix} 0 \\ 0.33 \end{pmatrix}$	Intersection point of medians

TABLE II.1
Median

Fig. I.2. Plot of line BC

III. Altitude

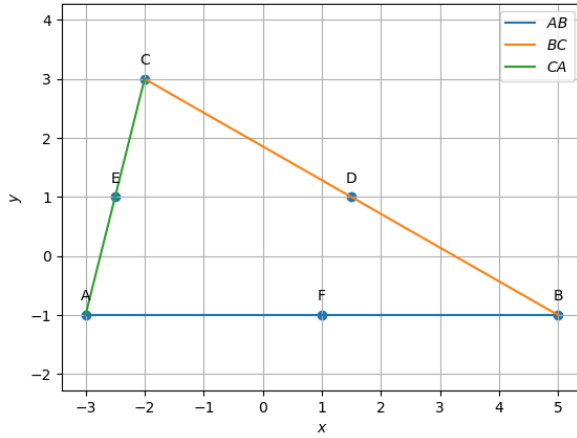## IV. Perpendicular Bisector

V. Angle Bisector
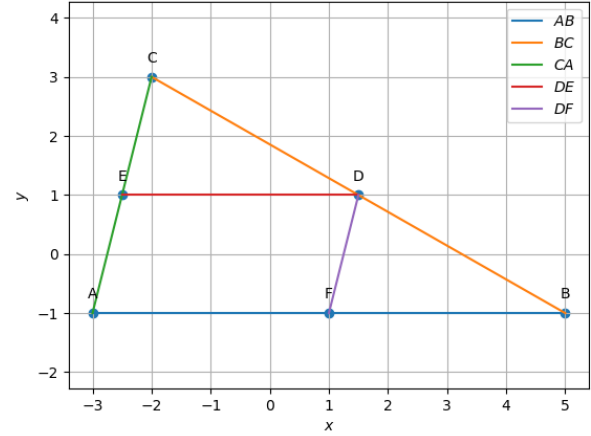
Fig. II.1. Triangle ABC with midpoint D,E and F
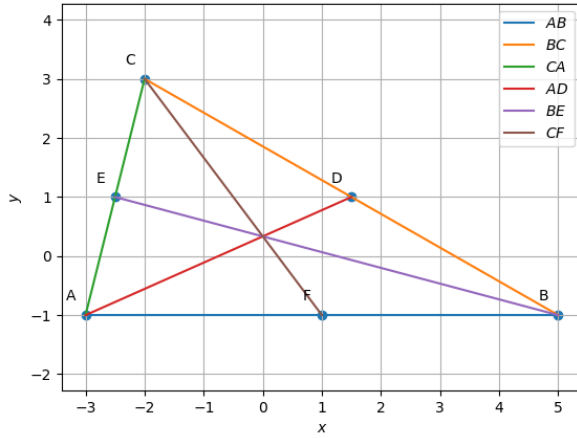

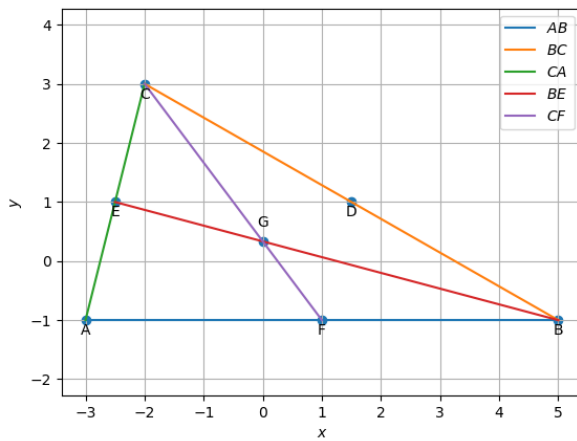Fig. II.4. Quadilateral AFDE in triangle ABC

Fig. II.2. Median AD, BE and CF

parameters	values	description
AD	$\begin{pmatrix} 7 \\ -4 \end{pmatrix}$	
BE	$\begin{pmatrix} -1.88 \\ -7.53 \end{pmatrix}$	Altitude
CF	$\begin{pmatrix} 4 \\ 0 \end{pmatrix}$	

TABLE III.1
ALTITUDE

Fig. II.3. Intersection of BE and CF at point G
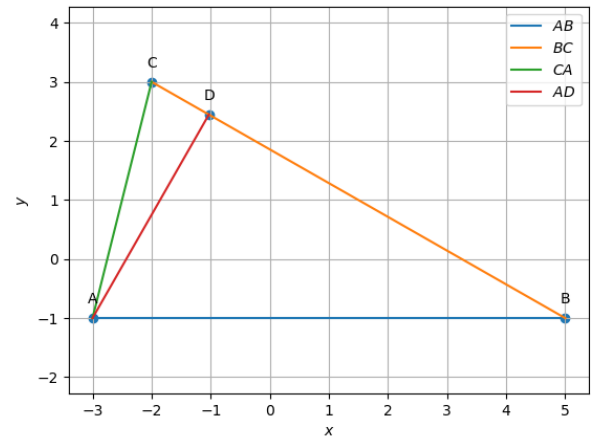
Fig. III.1. Altitude AD of line BC
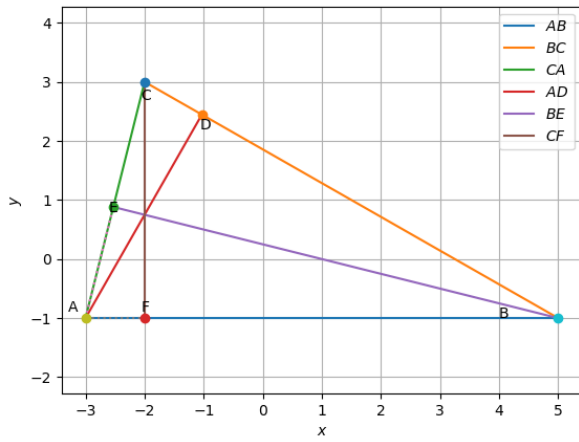
Fig. III.2. Altitude AD, BE, CF
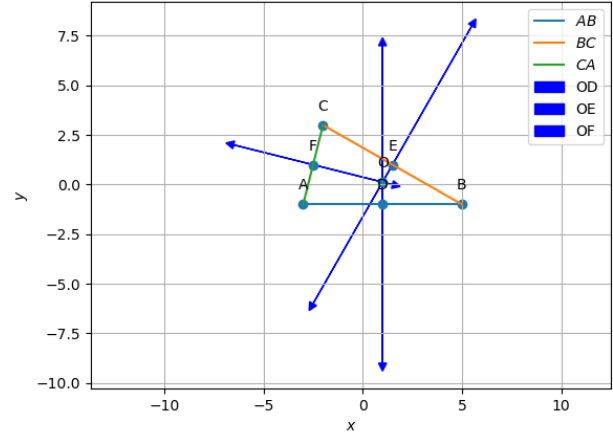
Fig. IV.1. Plot of perpendicular bisectors
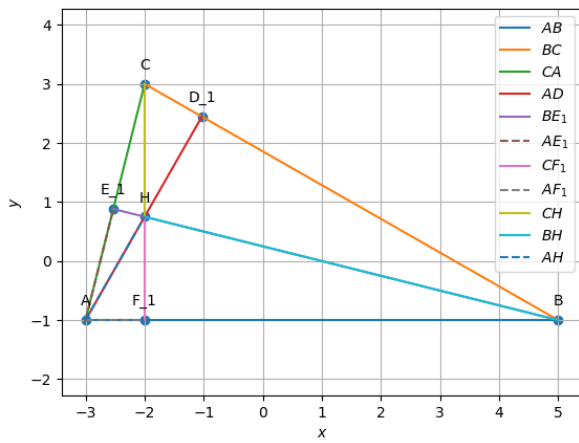

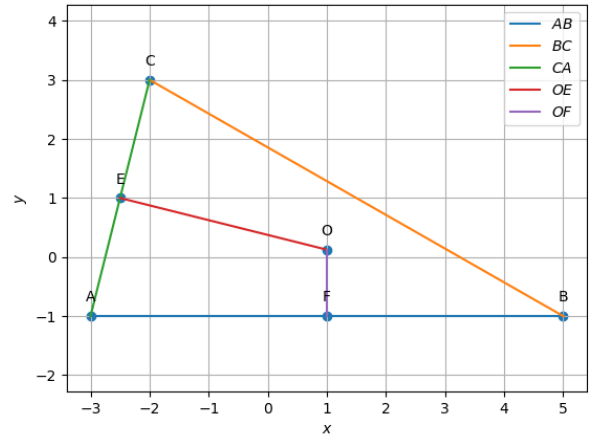Fig. III.3. Point of intersection H of altitudes

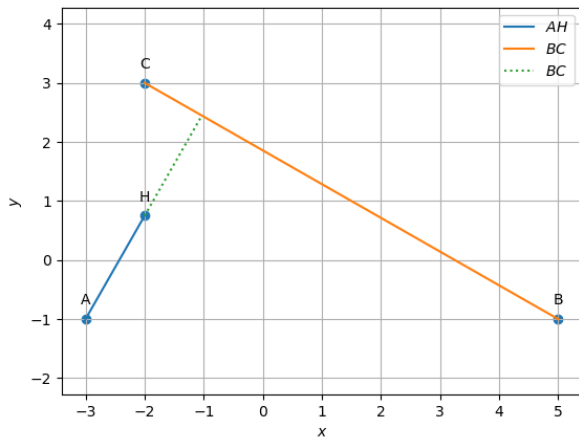Fig. IV.2. OE and OF are perpendiculat bisectors of AC and AB,respectively
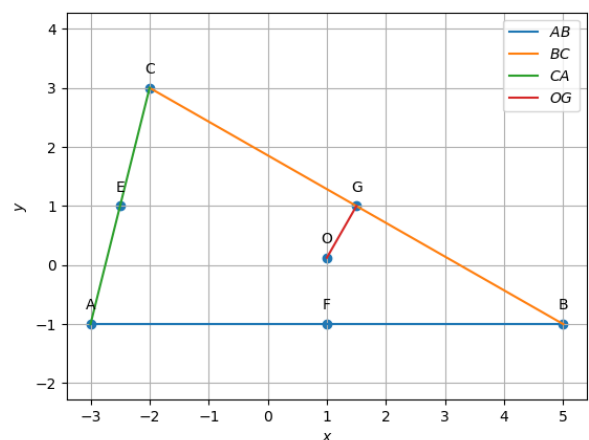

Fig. III.4. Line AH and BC
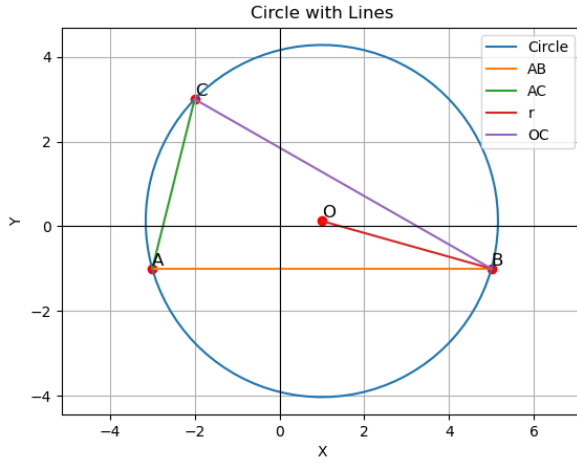

Fig. IV.3. Circumcenter of triangle ABC

Fig. IV.4. Plot of triangle ABC with circumcenter O and radius r
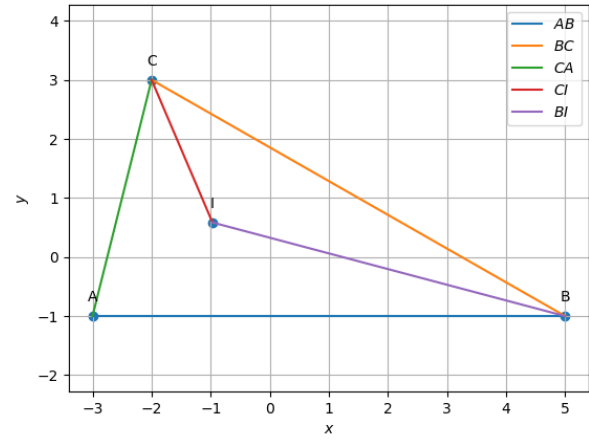

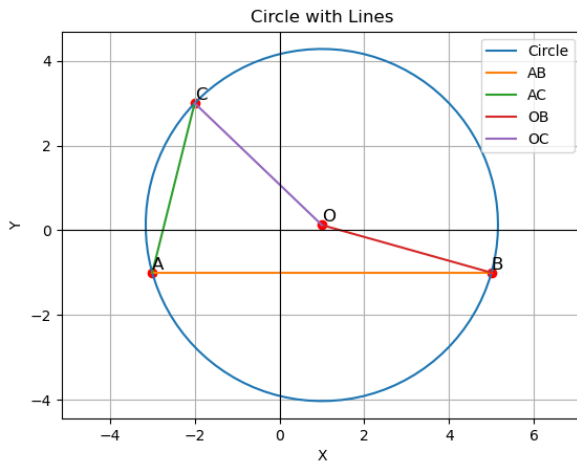Fig. V.2. Intersection point of angle bisectors of B and C

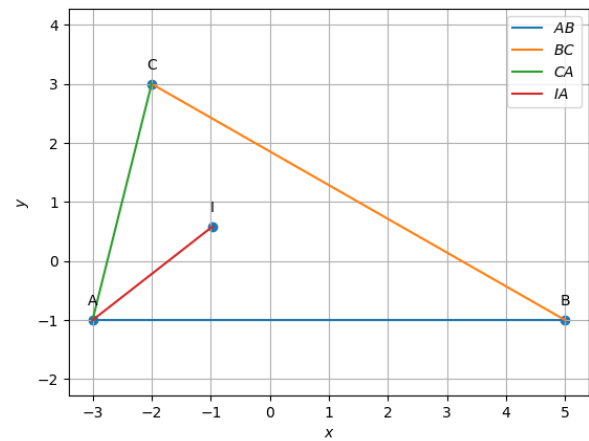Fig. IV.5. Plot of circumcircle and points A, B, C and D

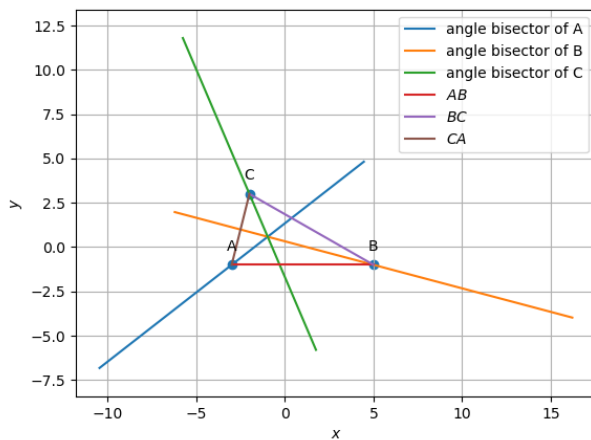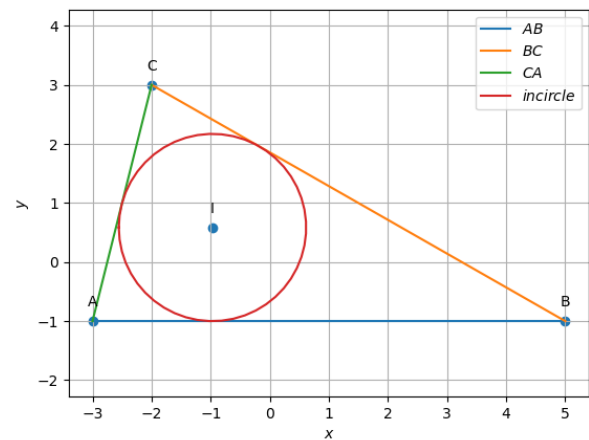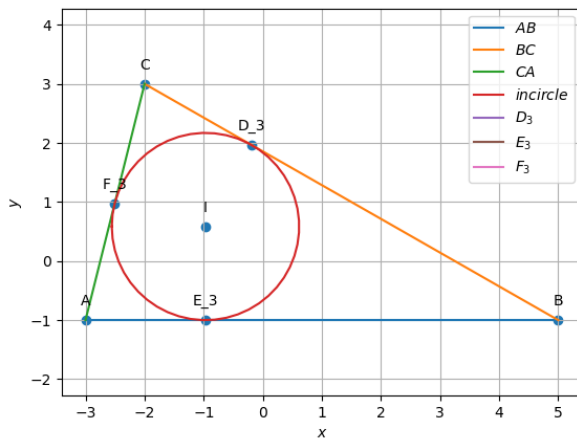Fig. V.3. Triangle ABC with incentre I

Fig. V.1. Angle Bisectors

Fig. V.4. Incircle of Triangle ABC

Fig. V.5. Point D_3, E_3 and F_3