

# EE23010 Assignment

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Consider a triangle with vertices:

$$\mathbf{A} = \begin{pmatrix} 1 \\ -1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} -4 \\ 6 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} -3 \\ -5 \end{pmatrix} \quad (1)$$

## I. VECTORS

parameter	value	description
$\mathbf{m}_1$	$\begin{pmatrix} -5 \\ 4 \end{pmatrix}$	$AB$
$\mathbf{n}_1^\top$	$(4 \ 5)$	
$c_1$	-21	
$\ B - A\ $	6.40	Length of AB
$\mathbf{m}_2$	$\begin{pmatrix} 9 \\ 6 \end{pmatrix}$	$BC$
$\mathbf{n}_2^\top$	$(6 \ -9)$	
$c_2$	-15	
$\ C - B\ $	10.81	Length of BC
$\mathbf{m}_3$	$\begin{pmatrix} -4 \\ -10 \end{pmatrix}$	$CA$
$\mathbf{n}_3^\top$	$(-10 \ 4)$	
$c_3$	-30	
$\ A - C\ $	10.77	Length of CA
rank	3	Non Collinear
area	33	Area of Triangle
$\angle A$	73.1416	Angle
$\angle B$	72.3498	
$\angle C$	34.5085	

TABLE I.1  
VECTORS

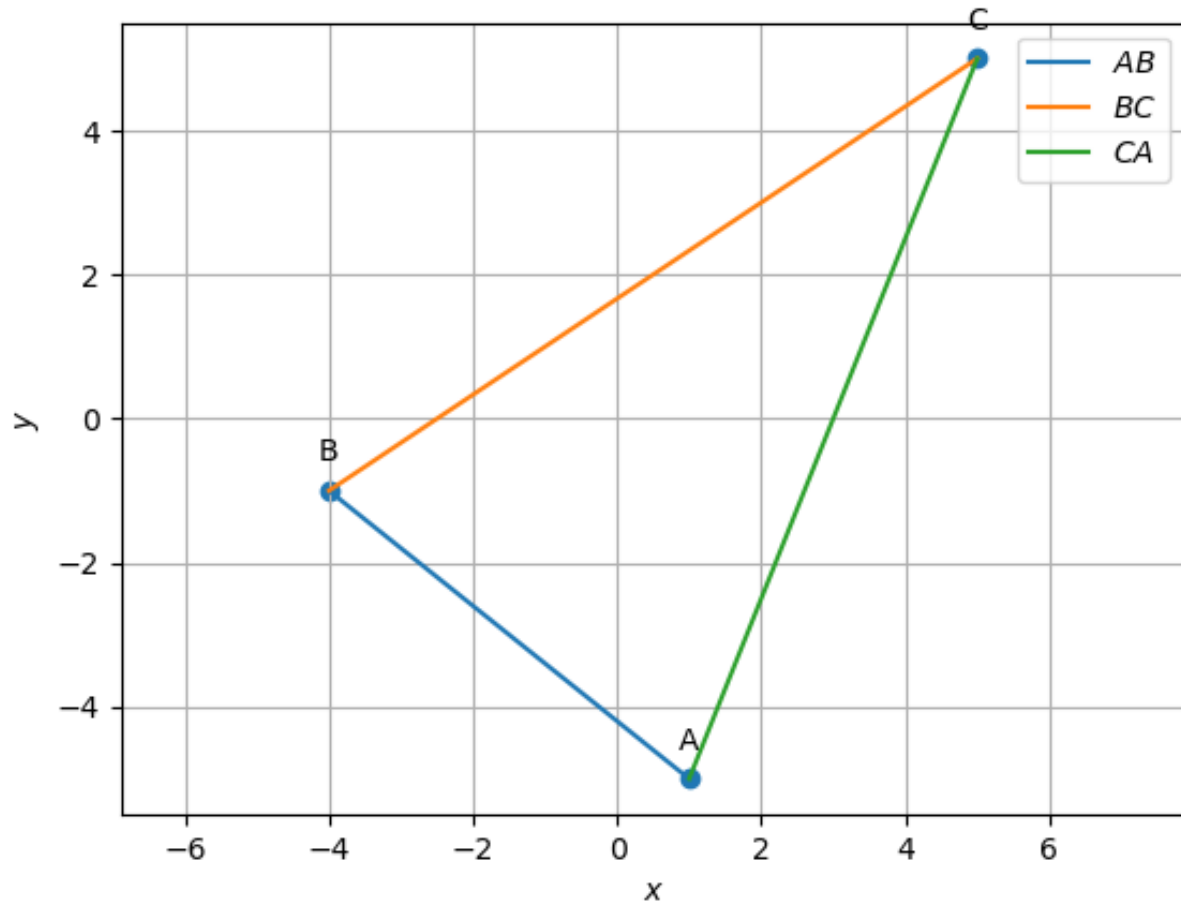


Fig. I.1. Triangle generated using python

## II. MEDIAN

parameter	value	description
<b>D</b>	$\begin{pmatrix} 0.5 \\ 2 \end{pmatrix}$	AD
<b>E</b>	$\begin{pmatrix} 3 \\ 0 \end{pmatrix}$	BE
<b>F</b>	$\begin{pmatrix} -1.5 \\ -3 \end{pmatrix}$	CF
$\mathbf{n}_1^T$	$\begin{pmatrix} 7 & 0.5 \end{pmatrix}$	normal form of AD
$c_1$	4.5	
$\mathbf{n}_2^T$	$\begin{pmatrix} 1 & 7 \end{pmatrix}$	normal form of BE
$c_2$	3	
$\mathbf{n}_3^T$	$\begin{pmatrix} -8 & 6.5 \end{pmatrix}$	normal form of CF
$c_3$	-7.5	
<b>G</b>	$\begin{pmatrix} 0.66 \\ -0.33 \end{pmatrix}$	Centroid of the triangle

TABLE II.1  
MEDIAN

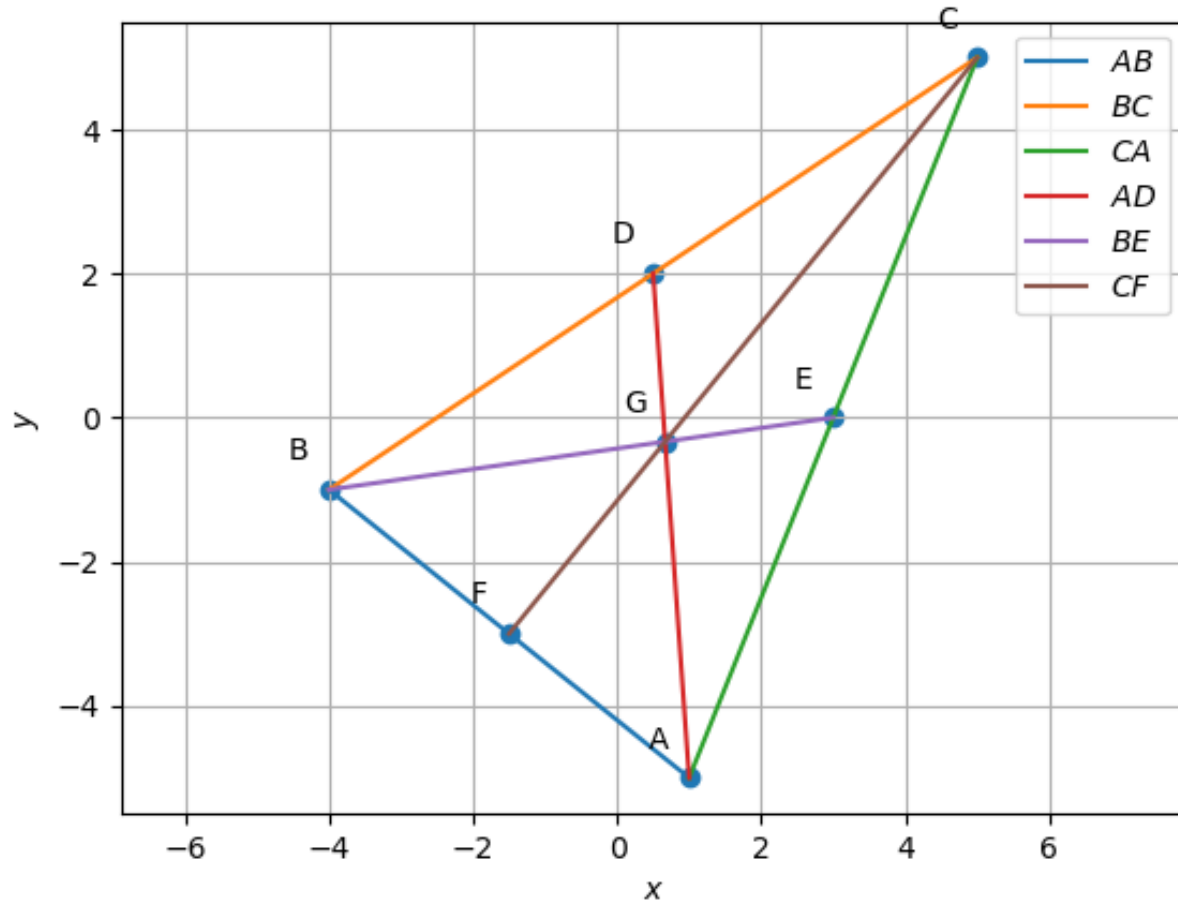


Fig. II.1. Triangle generated using python

### III. ALTITUDE

parameter	value	description
$\mathbf{n}_1^T$	$(9 \ 6)$	$AD_1$
$c_1$	-21	
$\mathbf{n}_2^T$	$(-4 \ -10)$	$BE_1$
$c_2$	26	
$\mathbf{n}_3^T$	$(-5 \ 4)$	$CF_1$
$c_3$	-5	
$\mathbf{H}$	$\begin{pmatrix} 2.833 \\ -0.833 \end{pmatrix}$	Orthocentre of Triangle

TABLE III.1  
ALTITUDE

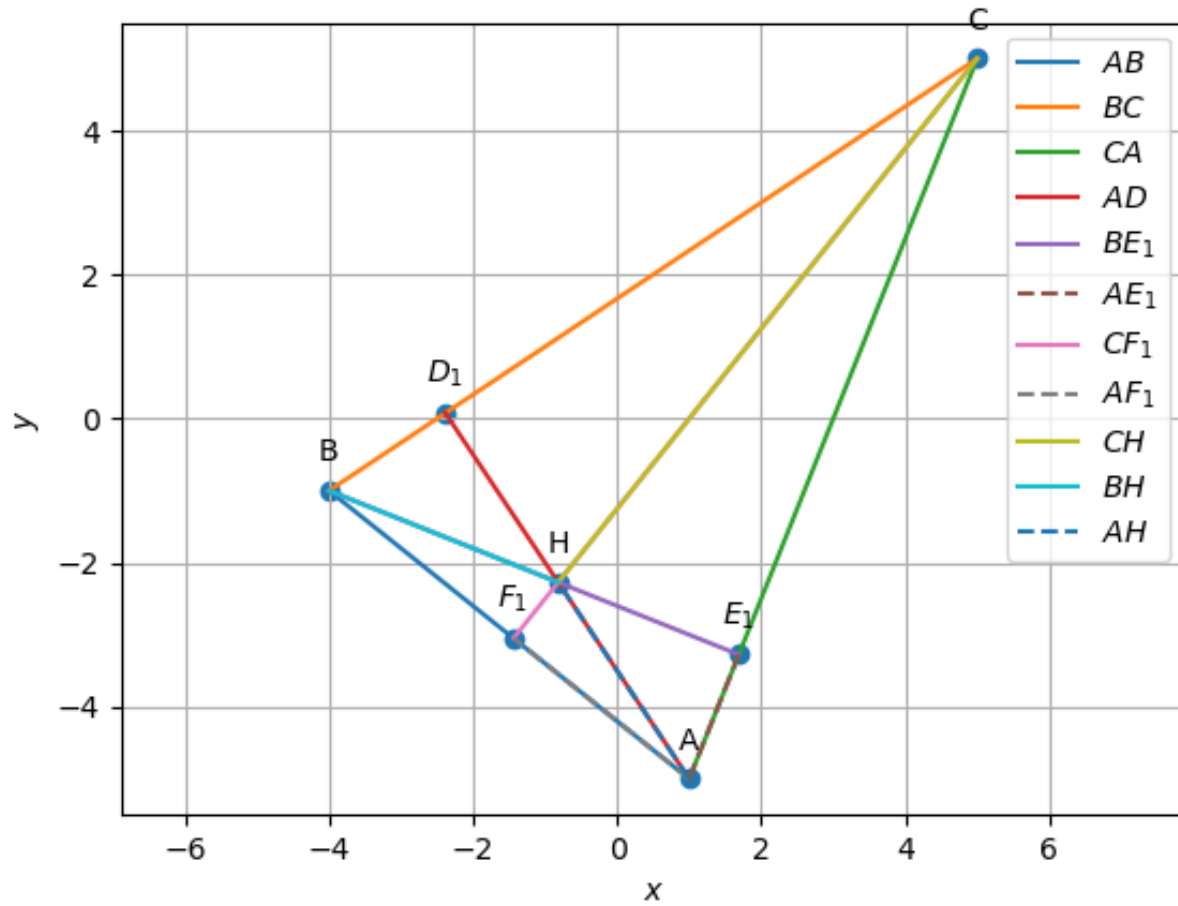


Fig. III.1. Triangle generated using python

#### IV. PERPENDICULAR BISECTOR

parameter	value	description
$\mathbf{n}_1^\top$	$(5 \ -4)$	Perpendicular bisector of AB
$c_1$	4.5	
$\mathbf{n}_2^\top$	$(-9 \ -16)$	Perpendicular bisector of BC
$c_2$	-16.5	
$\mathbf{n}_3^\top$	$(4 \ 10)$	Perpendicular bisector of CA
$c_3$	12	
$\mathbf{O}$	$\begin{pmatrix} 1.40 \\ 0.63 \end{pmatrix}$	Circumcircle
radius	5.65	

TABLE IV.1  
PERPENDICULAR BISECTOR

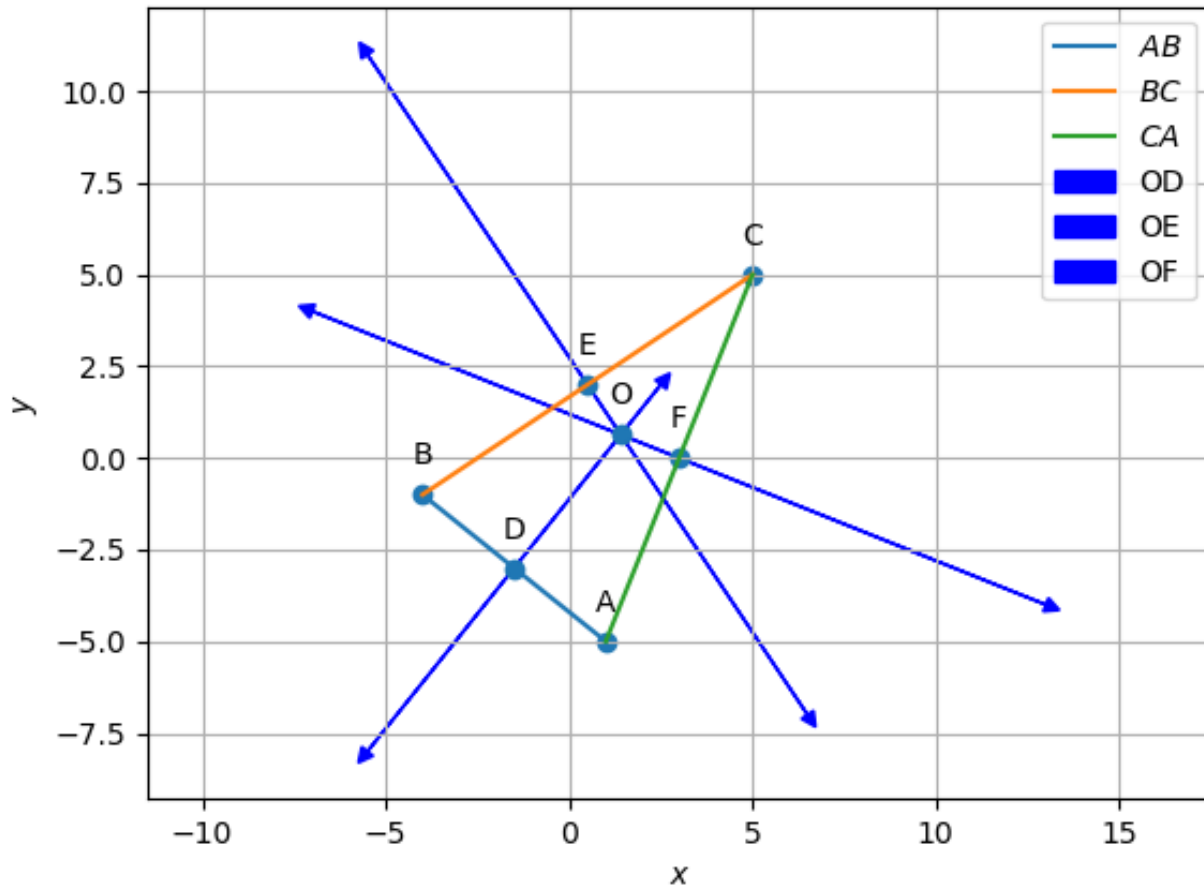


Fig. IV.1. Triangle generated using python

#### V. ANGLE BISECTOR

parameter	value	description
$\mathbf{n}_1^T$	$(1.55 \ 0.40)$	Angular bisector of A
$c_1$	-0.49	
$\mathbf{n}_2^T$	$(-0.06 \ -1.61)$	Angular bisector of B
$c_2$	1.89	
$\mathbf{n}_3^T$	$(-1.48 \ 1.20)$	Angular bisector of C
$c_3$	-1.39	
$\mathbf{I}$	$\begin{pmatrix} -0.008 \\ -1.173 \end{pmatrix}$	Incircle
radius	2.35	

TABLE V.I  
ANGLE BISECTOR

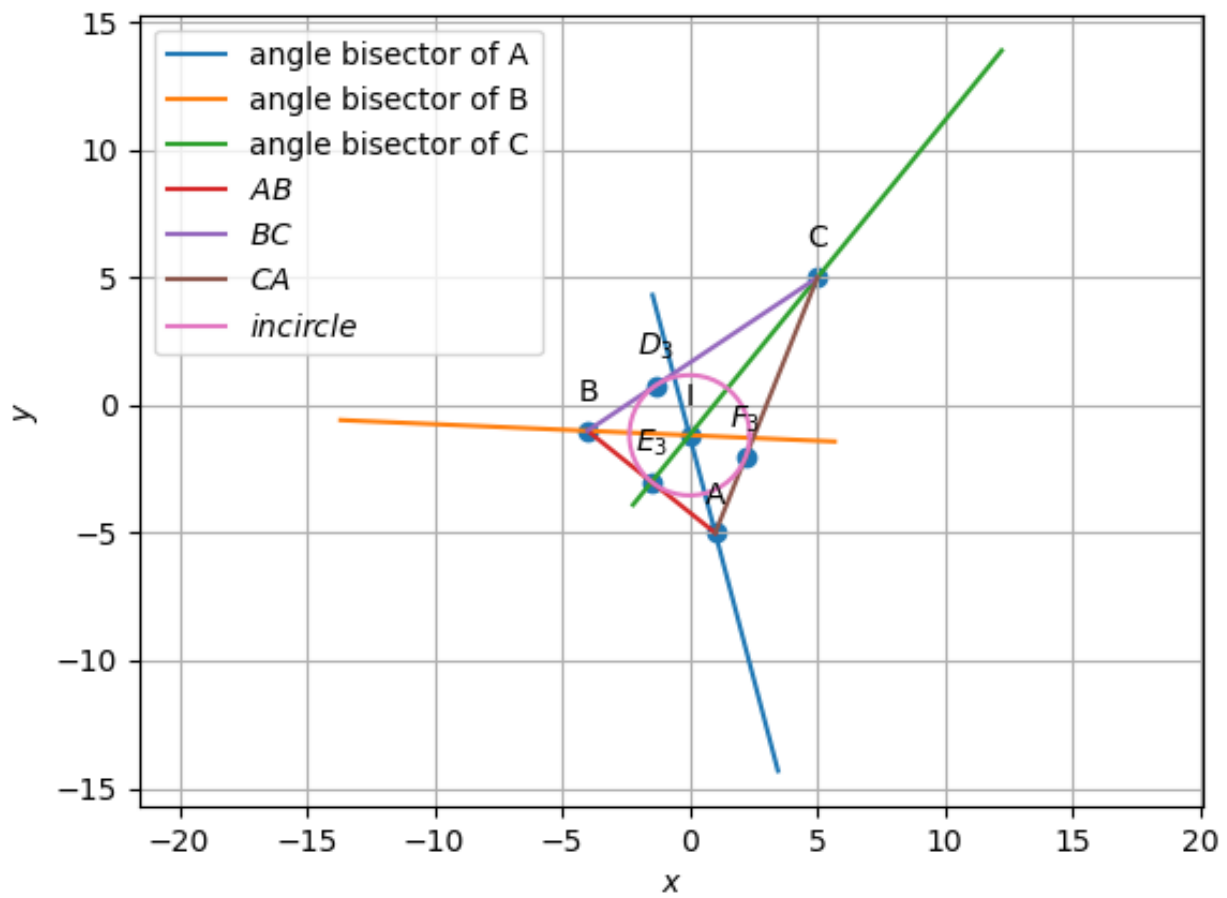


Fig. V.1. Triangle generated using python