Coordinate Geometry 3

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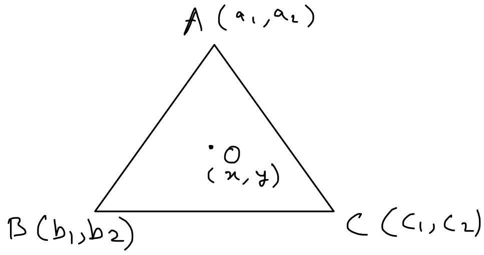

Let O be circumcentre of ΔABC.

Then,

$$\sqrt{(a_1-x)^2+(a_2-y)^2} = \sqrt{(b_1-x)^2+(b_2-y)^2} = \sqrt{(c_1-x)^2+(c_2-y)^2}$$

$$\Rightarrow (a_1-x)^2+(a_2-y)^2 = (b_1-x)^2+(b_2-y)^2 = (c_1-x)^2+(c_2-y)^2$$

$$\Rightarrow a_1^2+a_2^2-2a_1x-2a_2y = b_1^2+b_2^2-2b_1x-2b_2y = c_1^2+c_2^2-2c_1x-2c_2y$$

$$a_1^2+a_2^2-2a_2y+2b_2y = (2a_1-2b_1)x$$

we will get value of y

$$\Rightarrow x = \frac{a_1^2+a_2^2-(2a_2-2b_2)y}{2(a_1-b_1)}$$

put these value of x and find y

$$x = \frac{(a_1^2+a_2^2)(b_2-c_2)+(b_1^2+b_2^2)(c_2-a_2)+(c_1^2+c_2^2)(a_2-b_2)}{2(a_1(b_2-c_2)+b_1(c_2-a_2)+c_1(a_2-b_2))}$$

$$y = \frac{(a_1^2+a_2^2)(b_2-c_2)+(b_1^2+b_2^2)(c_2-a_2)+(c_1^2+c_2^2)(a_2-b_2)}{2(a_2(b_1-c_1)+b_2(c_1-a_1)+c_2(a_1-b_1))}$$

Home Work

Try to do it by finding the perpendicular bisectors intersection.