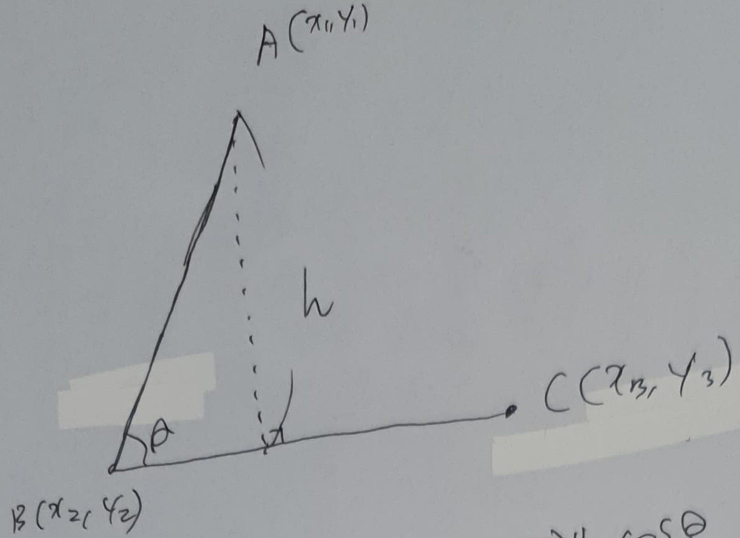
2020192053 김희석

1)



$\overrightarrow{BA} \cdot \overrightarrow{BC} = \|\overrightarrow{BA}\|\|\overrightarrow{BC}\| \cos\theta$

$\|\overrightarrow{BA}\| \cdot \sin\theta = h$

$\therefore h = \|\overrightarrow{BA}\| \sqrt{1-\left(\frac{\overrightarrow{BA}\cdot\overrightarrow{BC}}{\|\overrightarrow{BA}\|\|\overrightarrow{BC}\|}\right)^2}$ $\left(\because \sin\theta > 0,\ \cos^2\theta = 1-\sin^2\theta\right)$

$= \frac{\sqrt{\|\overrightarrow{BA}\|^2\|\overrightarrow{BC}\|^2 - (\overrightarrow{BA}\cdot\overrightarrow{BC})^2}}{\|\overrightarrow{BC}\|}$

$= \frac{|x_2y_1 - y_2x_1 - x_3y_1 + x_1y_3 + y_2x_3 - x_2y_3|}{\sqrt{(x_2-x_3)^2 + (y_2-y_3)^2}}$ //

2) $\angle A = \varphi$라 하자.

$\Rightarrow \overrightarrow{AB} \cdot \overrightarrow{AC} = \|\overrightarrow{AB}\|\|\overrightarrow{AC}\| \cos\varphi$

$\therefore \cos\varphi = \frac{x_2x_3 - x_1x_3 + x_1^2 - x_2x_1 + y_2y_3 + y_1^2 - y_2y_1 - y_3y_1}{\sqrt{((x_1-x_2)^2+(y_1-y_2)^2)((x_1-x_3)^2+(y_1-y_3)^2)}}$

$\therefore \angle A = \varphi = \cos^{-1}\left(\frac{x_2x_3 - x_1x_3 + x_1^2 - x_2x_1 + y_2y_3 + y_1^2 - y_2y_1 - y_3y_1}{\sqrt{((x_1-x_2)^2+(y_2-y_1)^2)((x_1-x_3)^2+(y_1-y_3)^2)}}\right)$ //