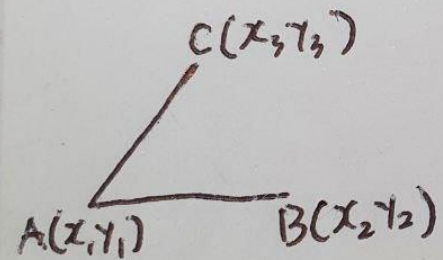
$$S = \frac{1}{2}\sqrt{|\vec{a}|^2 \cdot |\vec{b}|^2 - (\vec{a}\cdot\vec{b})^2}$$

$$= \frac{1}{2}(|x_1y_2 + x_2y_3 + x_3y_1 - x_2y_1 - x_3y_2 - x_1y_3|)$$



$$a = (x_2 - x_1), (y_2 - y_1)$$

$$b = (x_3 - x_1), (y_3 - y_1)$$