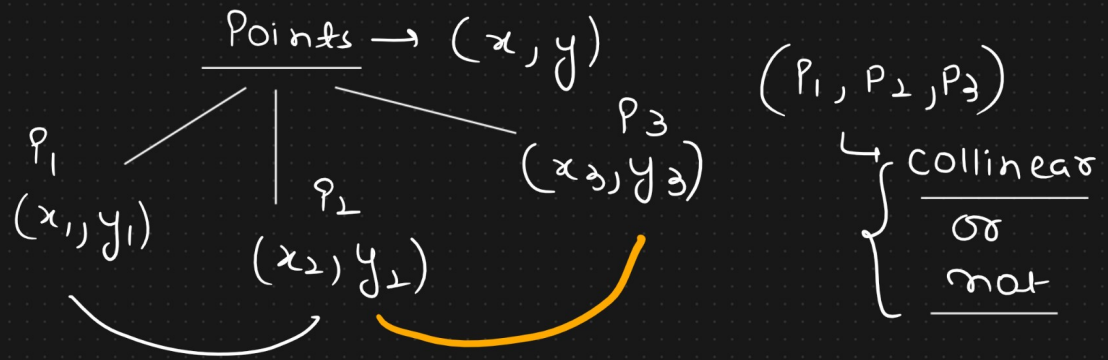


Collinear Points



$$m_1 = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m_2 = \frac{y_3 - y_2}{x_3 - x_2}$$

Approach 1

$$m_1 = m_2 \rightarrow \text{Points are collinear}$$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{y_3 - y_2}{x_3 - x_2}$$

$$(y_2 - y_1)(x_3 - x_2) = (x_2 - x_1)(y_3 - y_2)$$

Approach 2

$$\text{Area of triangle} = 0$$

(collinear)

$$\Rightarrow \frac{1}{2} (x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2))$$