

# Lines Parameterization

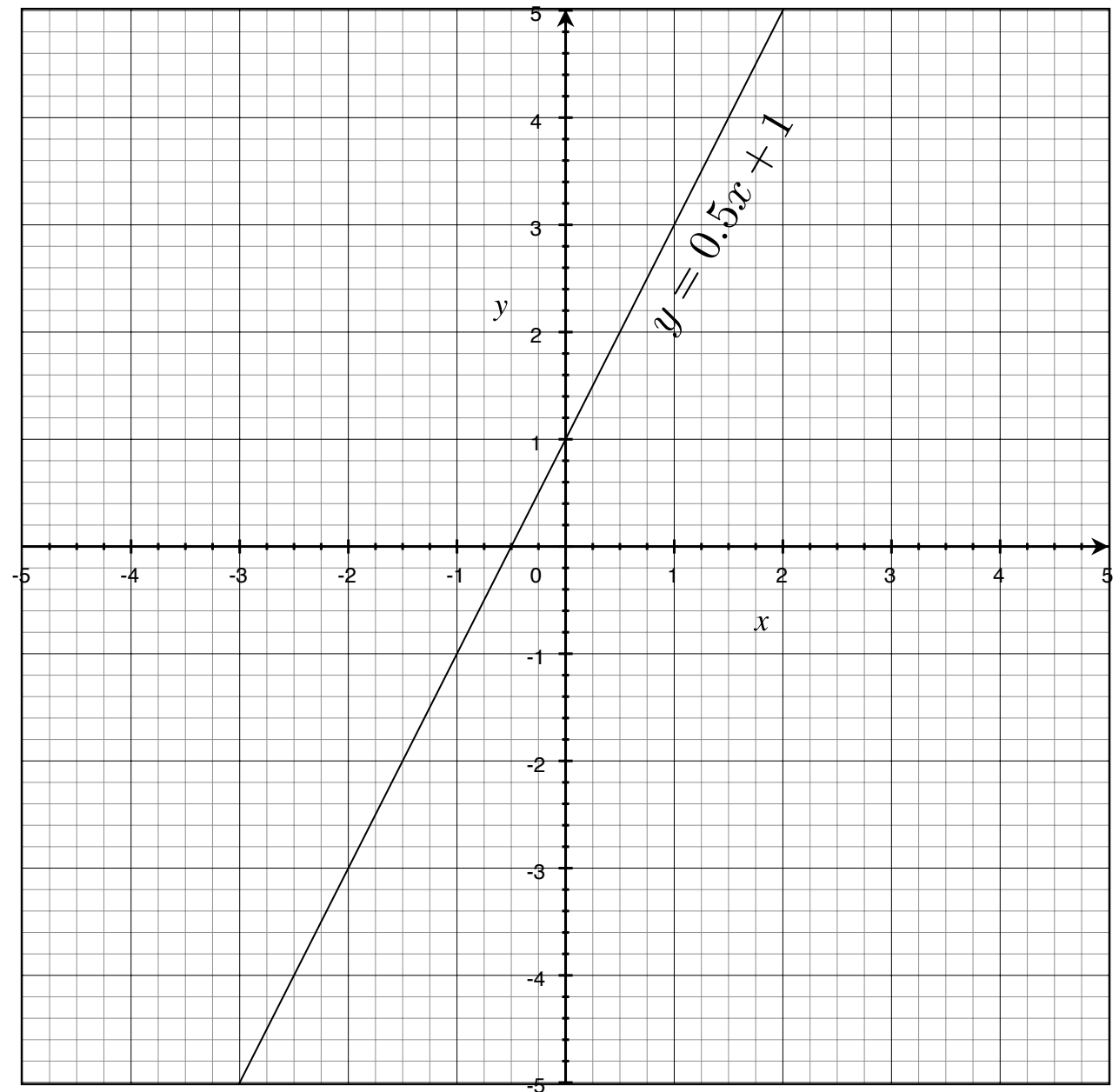
Computer Vision

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# Slope intercept form

$$y = mx + b$$

↑                      ↑  
slope                  y-intercept



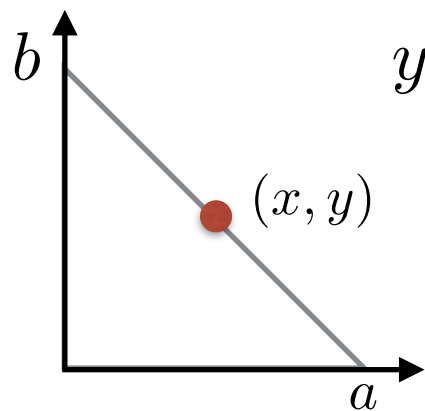
# Double intercept form

$$\frac{x}{a} + \frac{y}{b} = 1$$

x-intercept

y-intercept

Derivation:

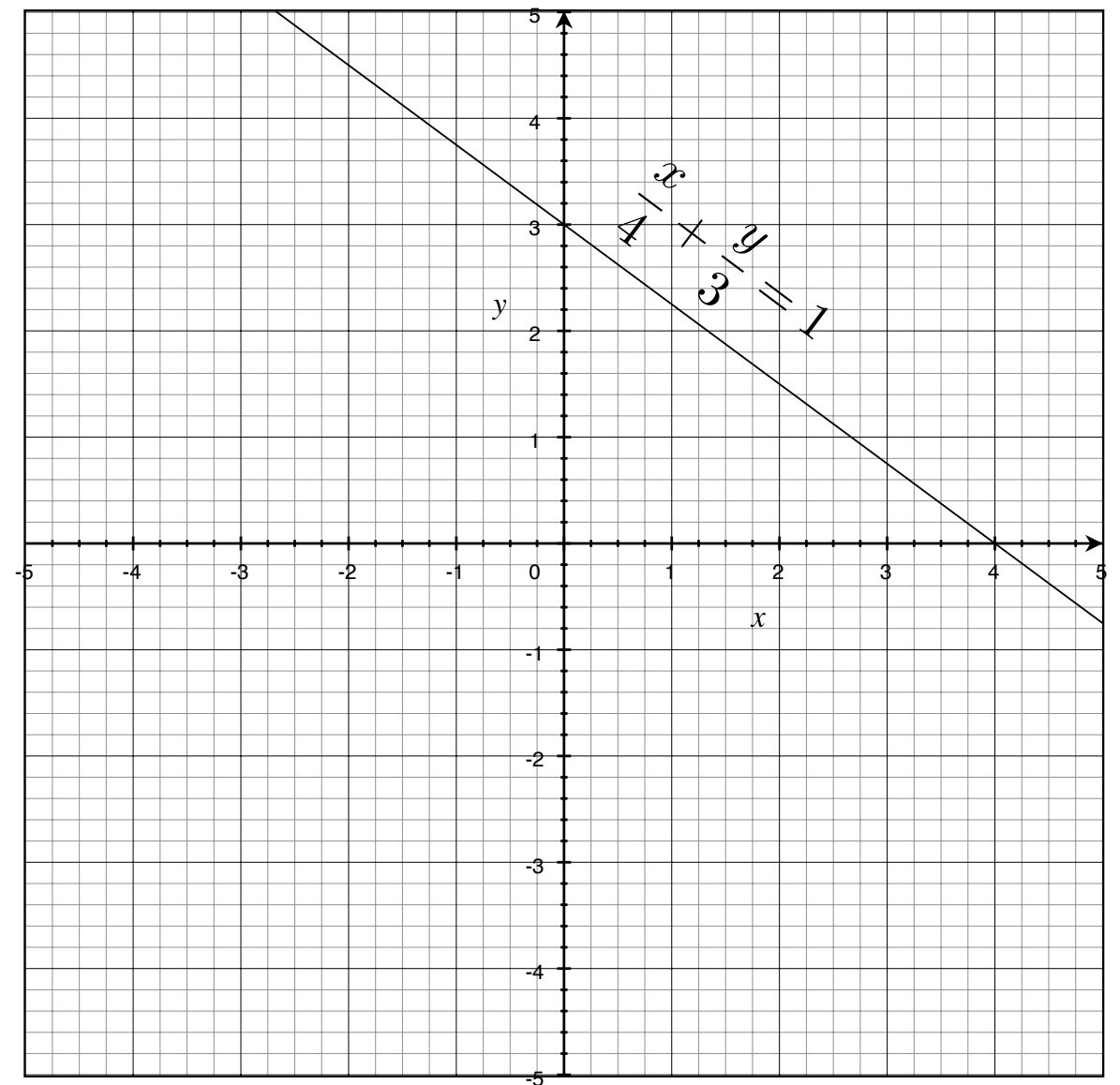


(Similar slope)  $\frac{y - b}{x - 0} = \frac{0 - y}{a - x}$

$$ya + yx - ba + bx = -yx$$

$$ya + bx = ba$$

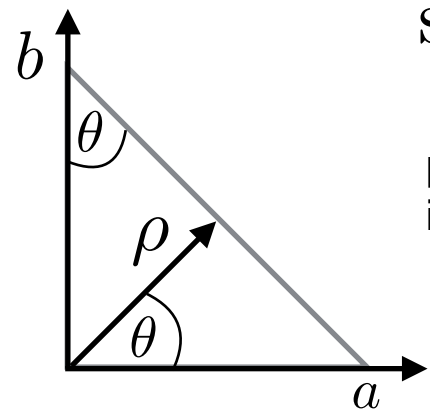
$$\frac{y}{b} + \frac{x}{a} = 1$$



# Normal Form

$$x \cos \theta + y \sin \theta = \rho$$

Derivation:



$$\cos \theta = \frac{\rho}{a} \rightarrow a = \frac{\rho}{\cos \theta}$$

$$\sin \theta = \frac{\rho}{b} \rightarrow b = \frac{\rho}{\sin \theta}$$

plug into double intercept form:  $\frac{x}{a} + \frac{y}{b} = 1$

$$x \cos \theta + y \sin \theta = \rho$$

