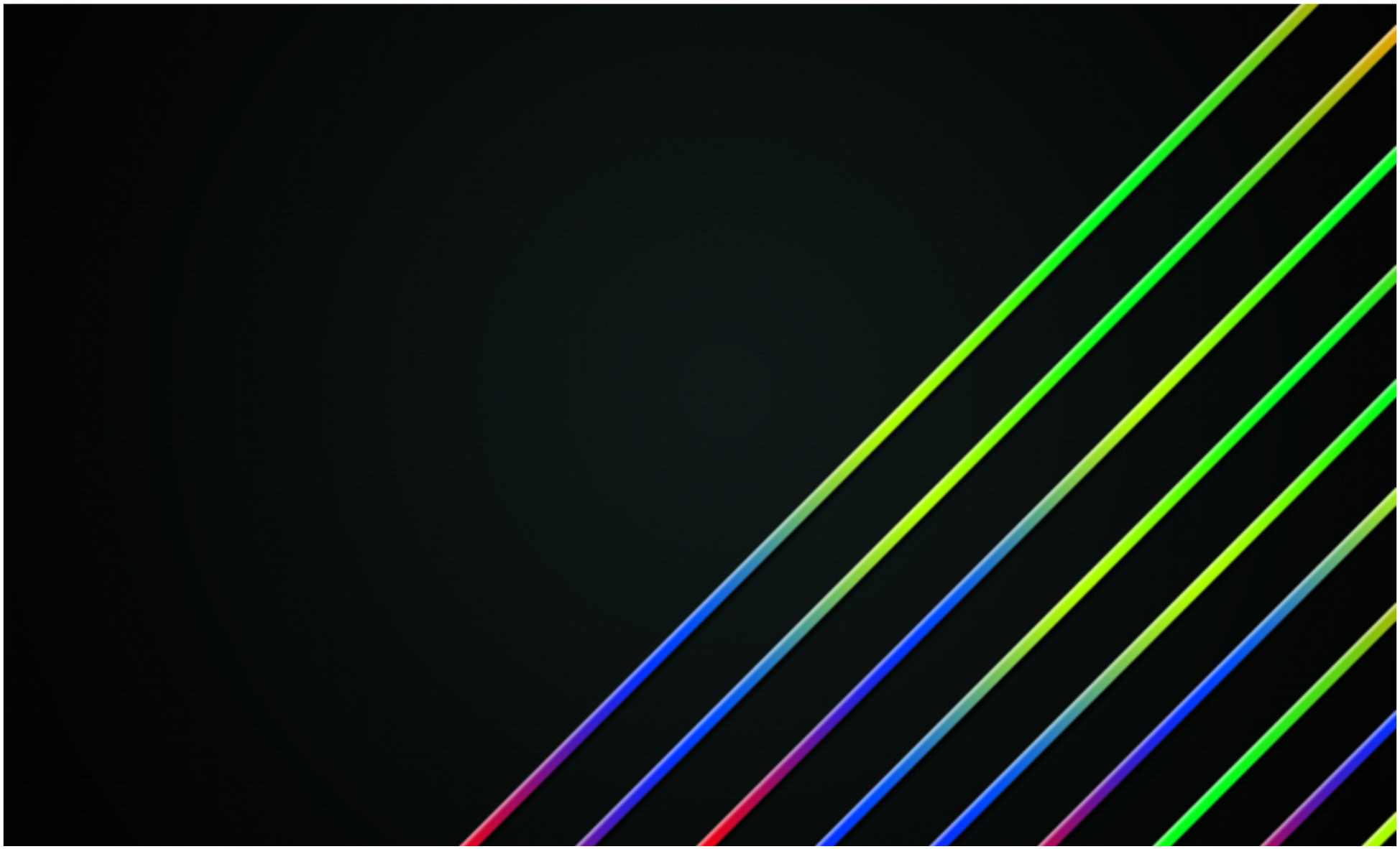


# Lines Parameterization

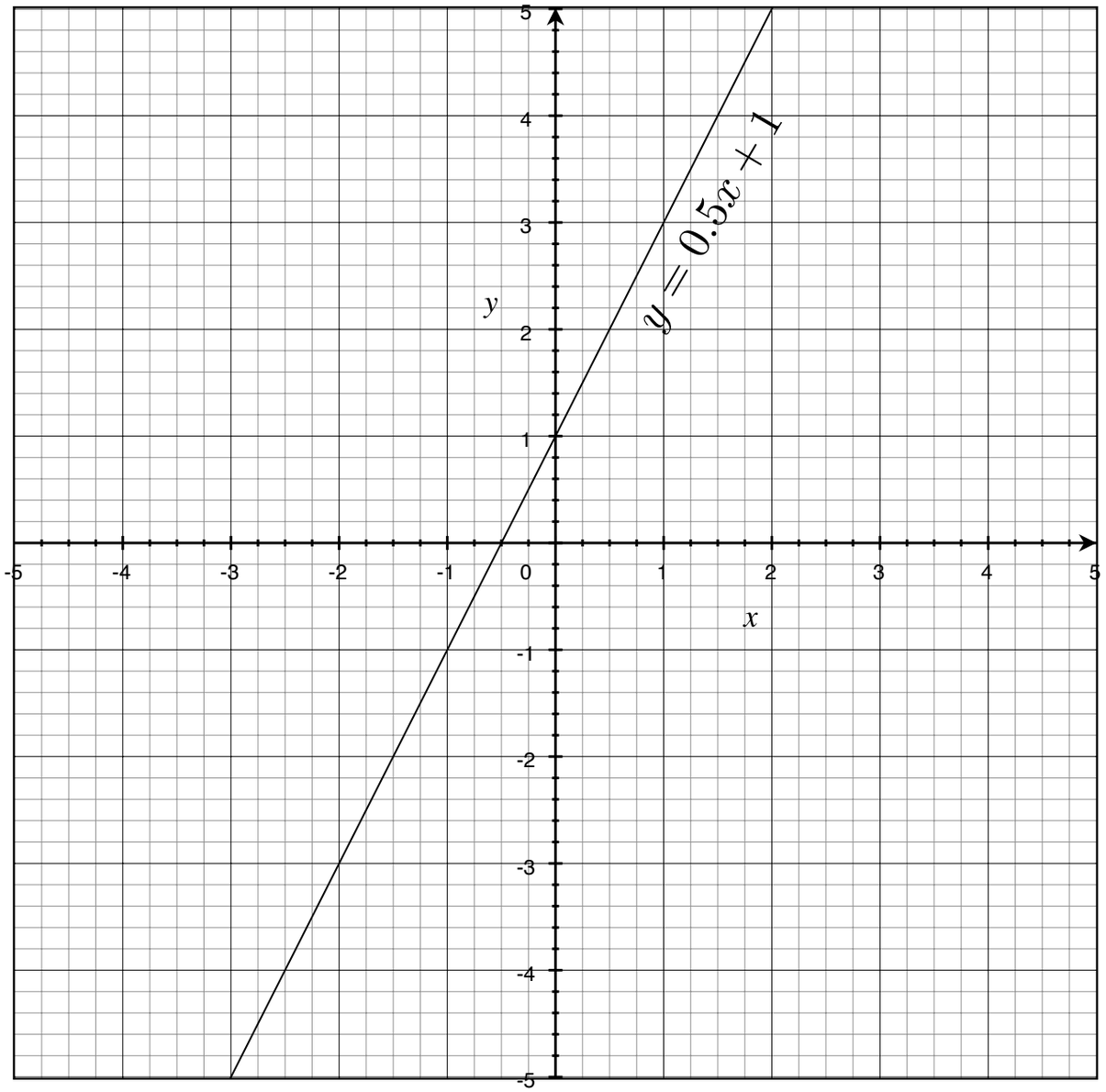
16-385 Computer Vision (Kris Kitani)

**Carnegie Mellon University**

# Slope intercept form

$$y = mx + b$$

slope  y-intercept

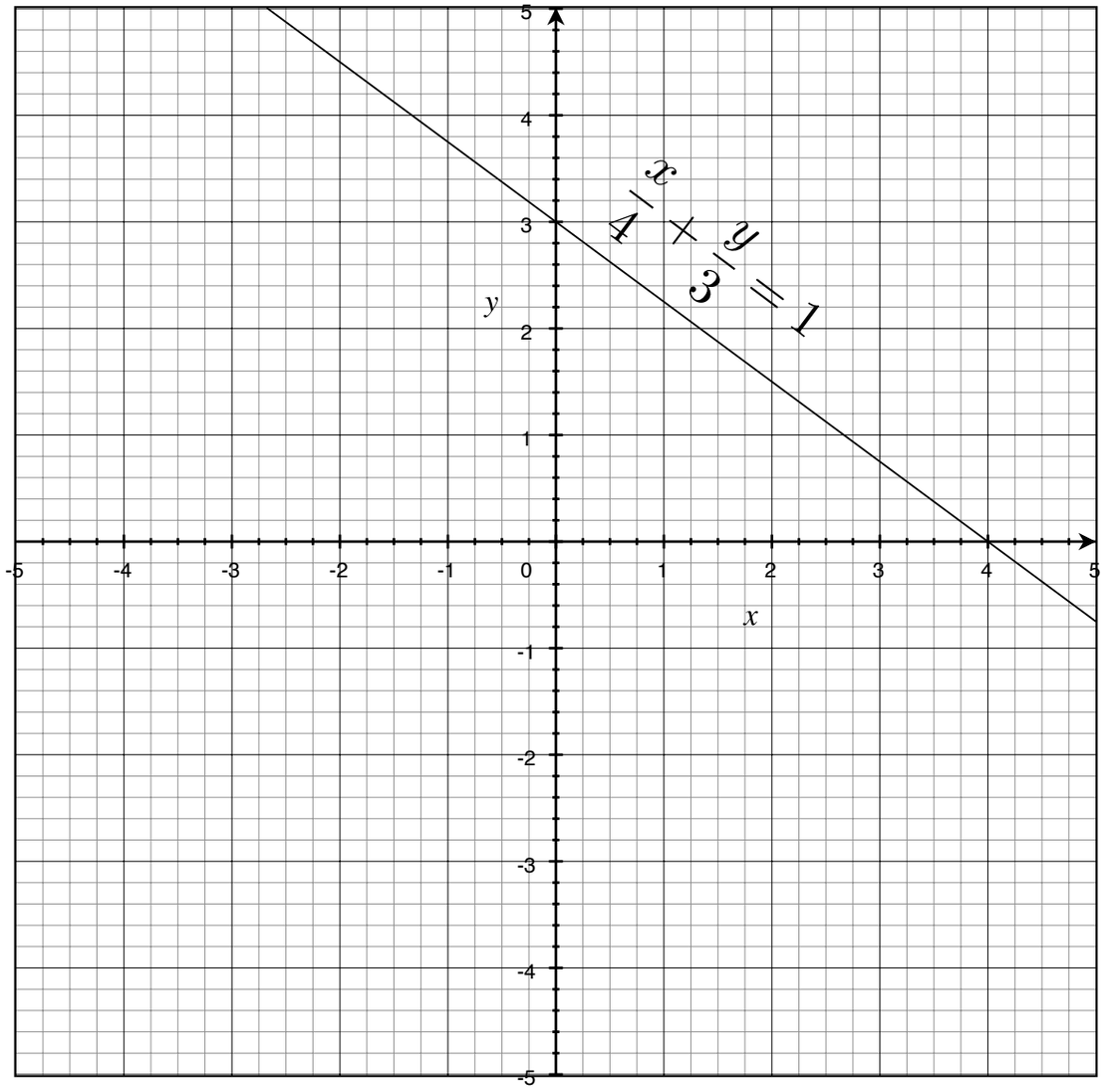


# Double intercept form

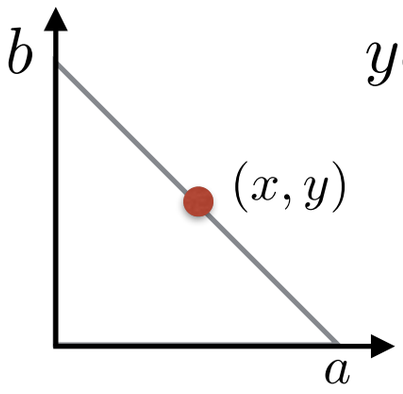
$$\frac{x}{a} + \frac{y}{b} = 1$$

x-intercept

y-intercept




Derivation:




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

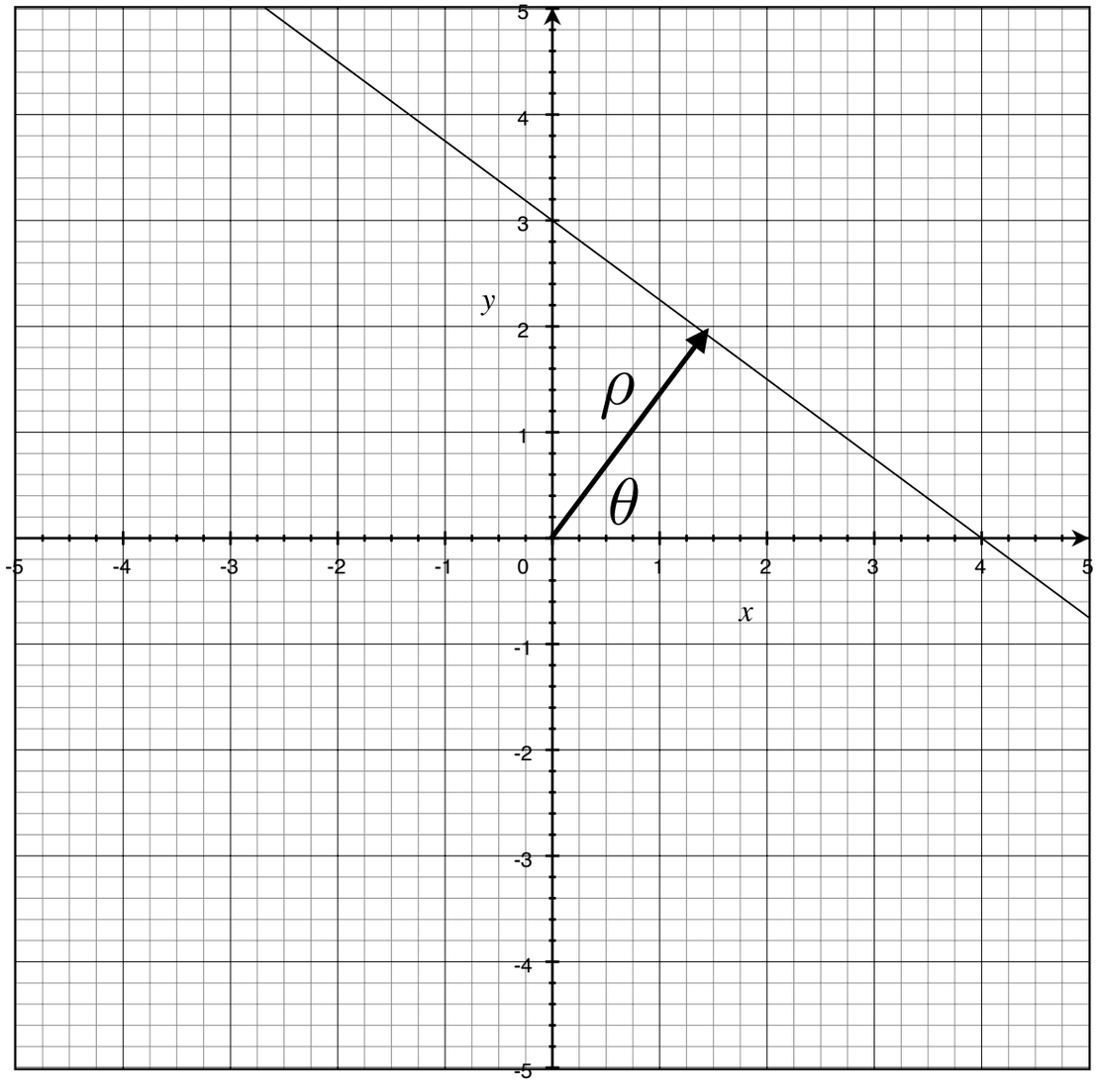
$$ya + yx - ba + bx = -yx$$

$$ya + bx = ba$$

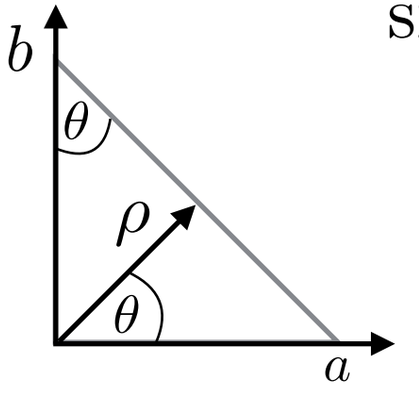
$$\frac{y}{b} + \frac{x}{a} = 1$$

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

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