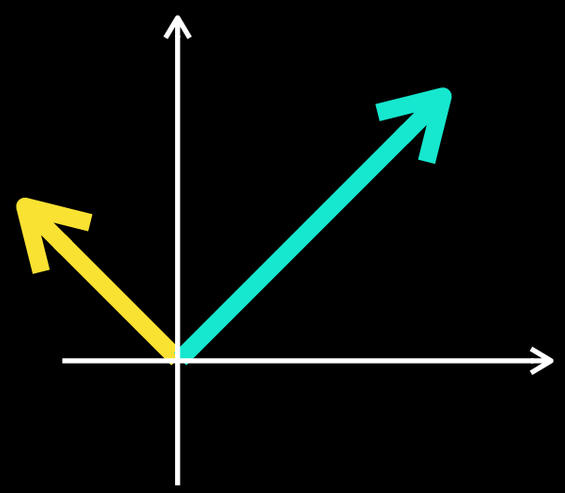
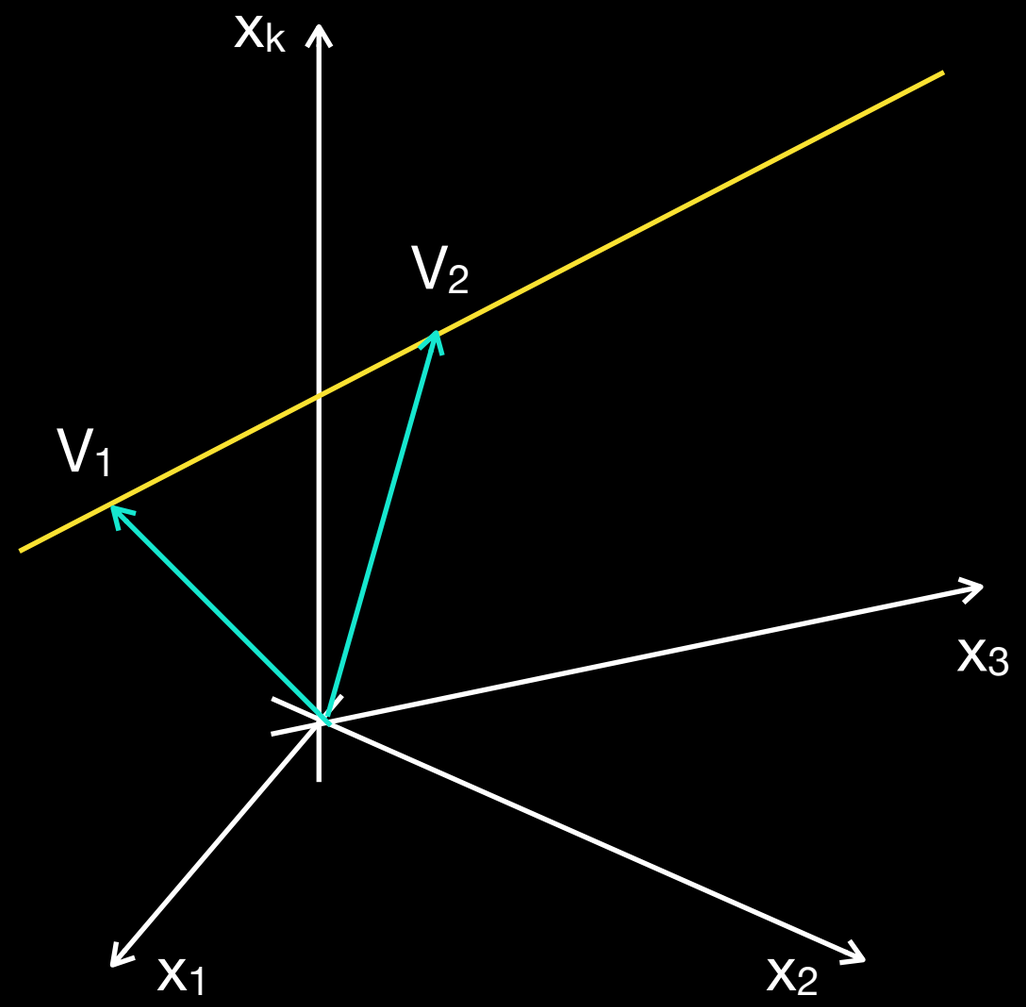
Line equation

Linear Algebra Essentials



Given: V_1, V_2

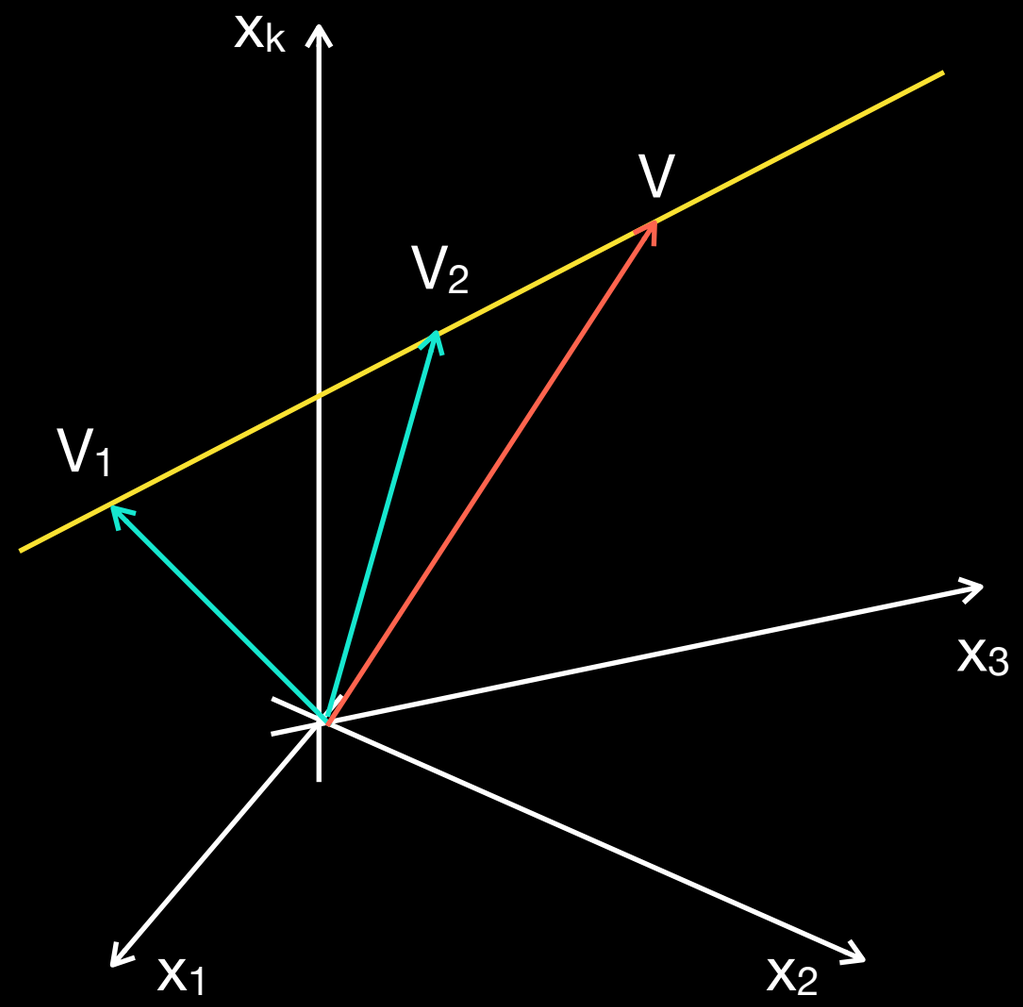
Find: All points belonging to the line



Given: V_1, V_2

Find: All points belonging to the line

$V \in$ Line

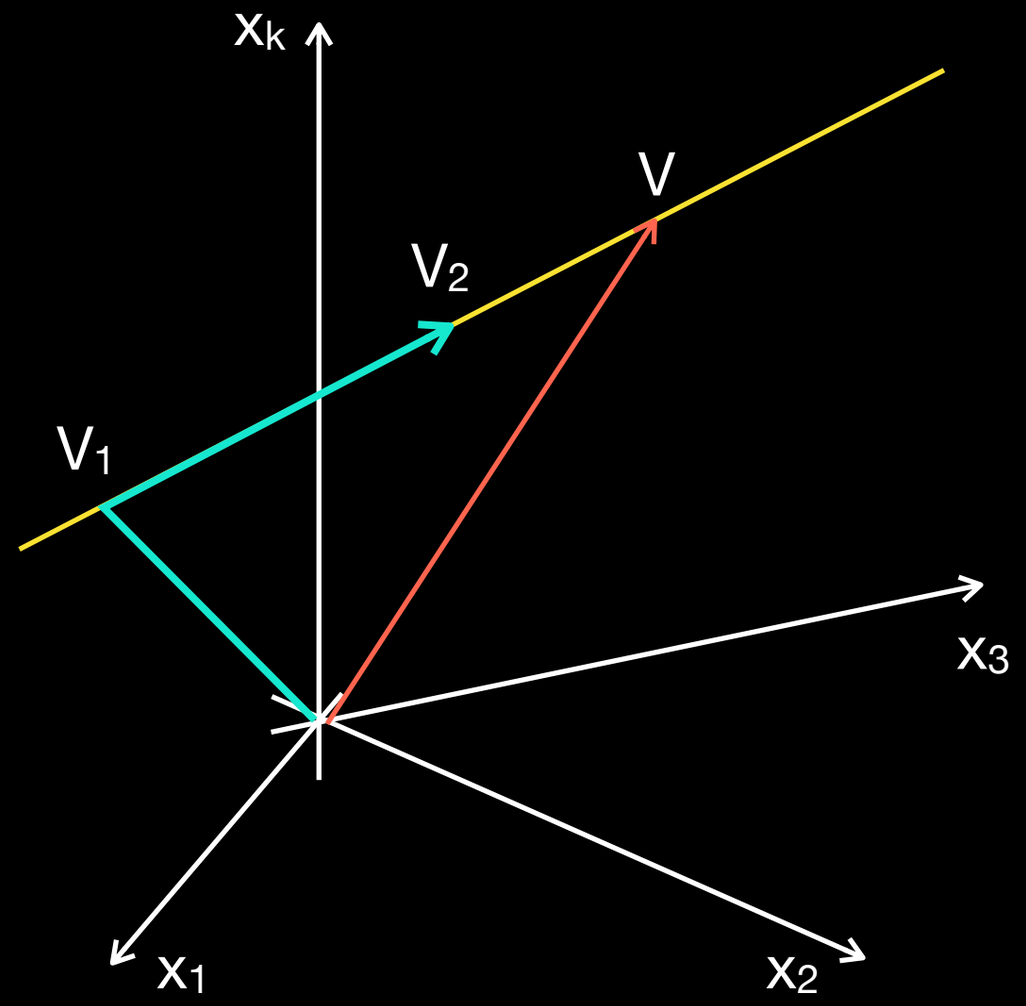


Given: V_1, V_2

Find: All points belonging to the line

$V \in \text{Line}$

$V_2 = V_1 + (V_2 - V_1)$



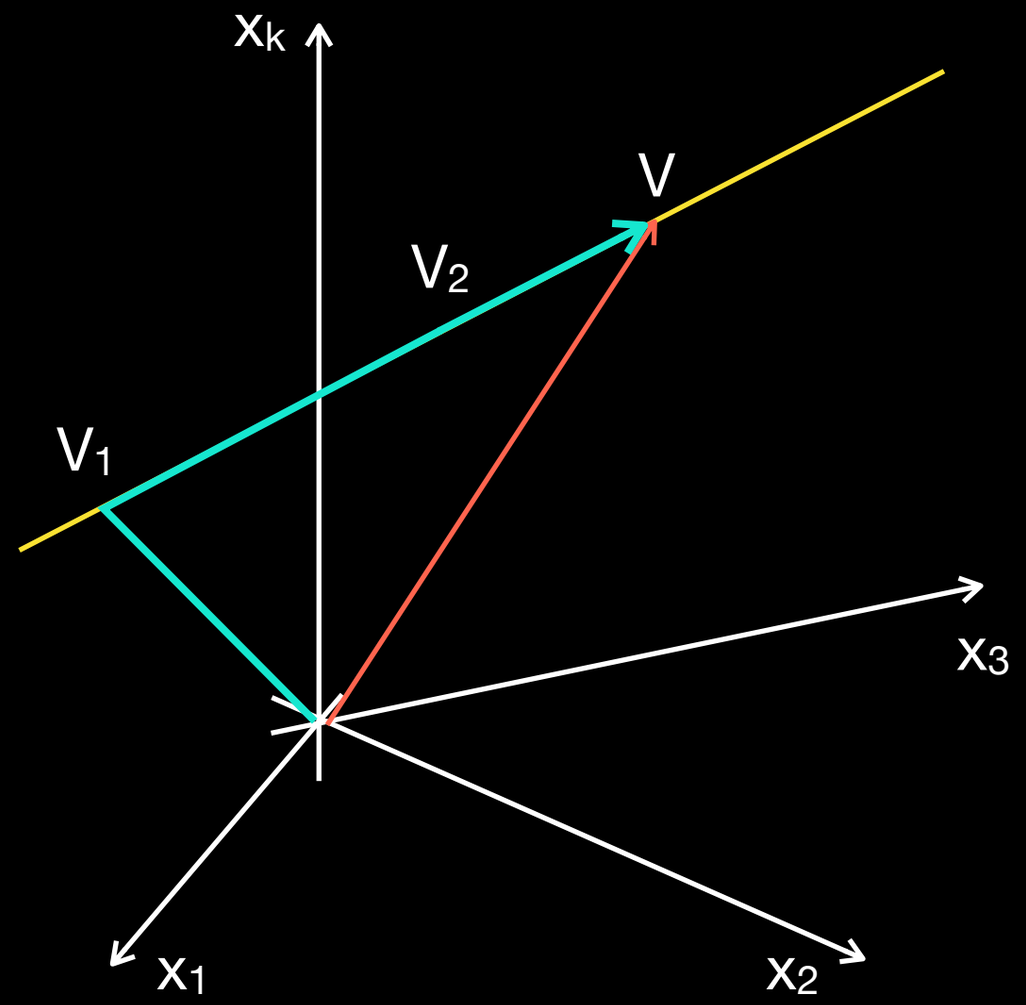
Given: V_1, V_2

Find: All points belonging to the line

$V \in$ Line

$V_2 = V_1 + (V_2 - V_1)$

$V = V_1 + t\,(V_2 - V_1)$



Given: V_1, V_2

Find: All points belonging to the line

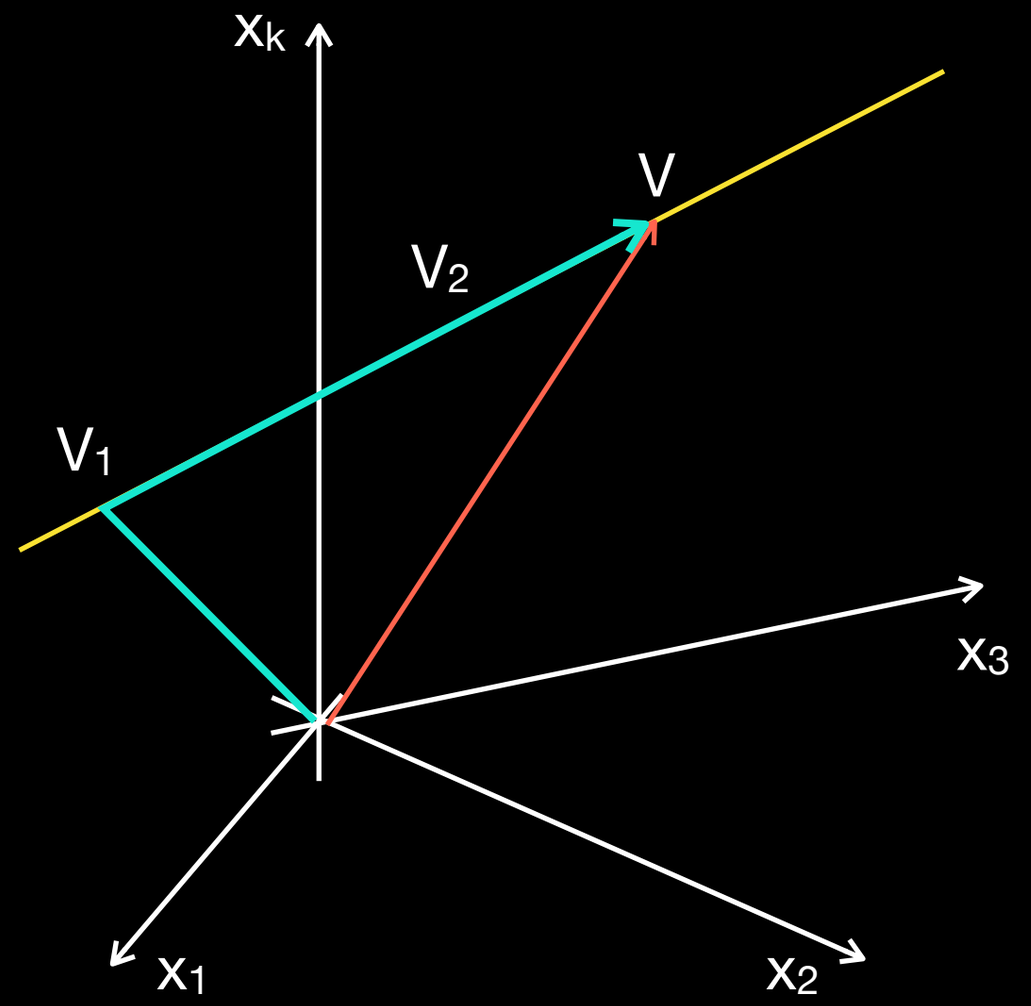
$V \in$ Line

$V_2 = V_1 + (V_2 - V_1)$

$V = V_1 + t\,(V_2 - V_1)$

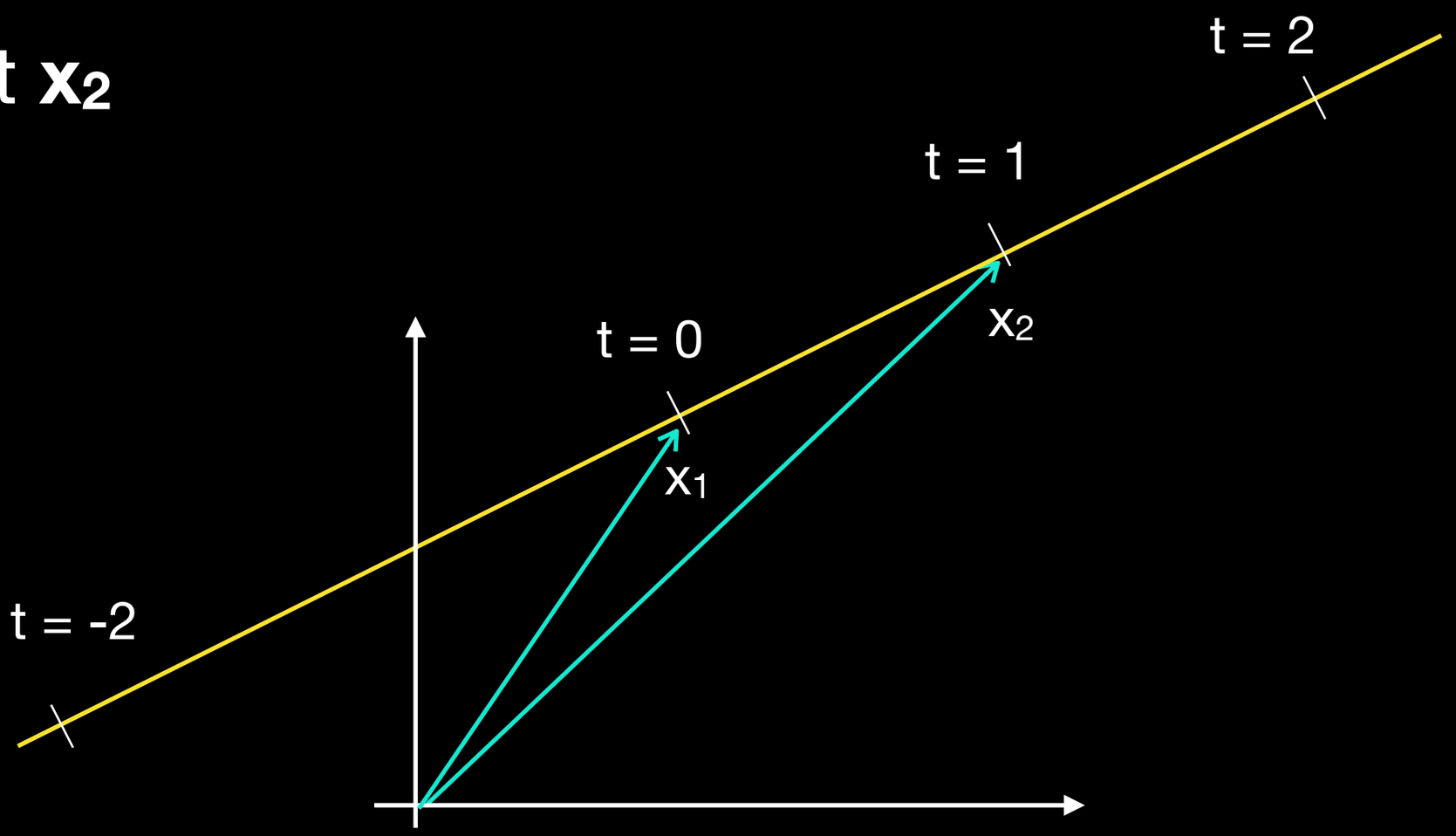
$$\mathbf{V = (1-t)\,V_1 + t\,V_2}$$

$t \in (-\infty, +\infty)$



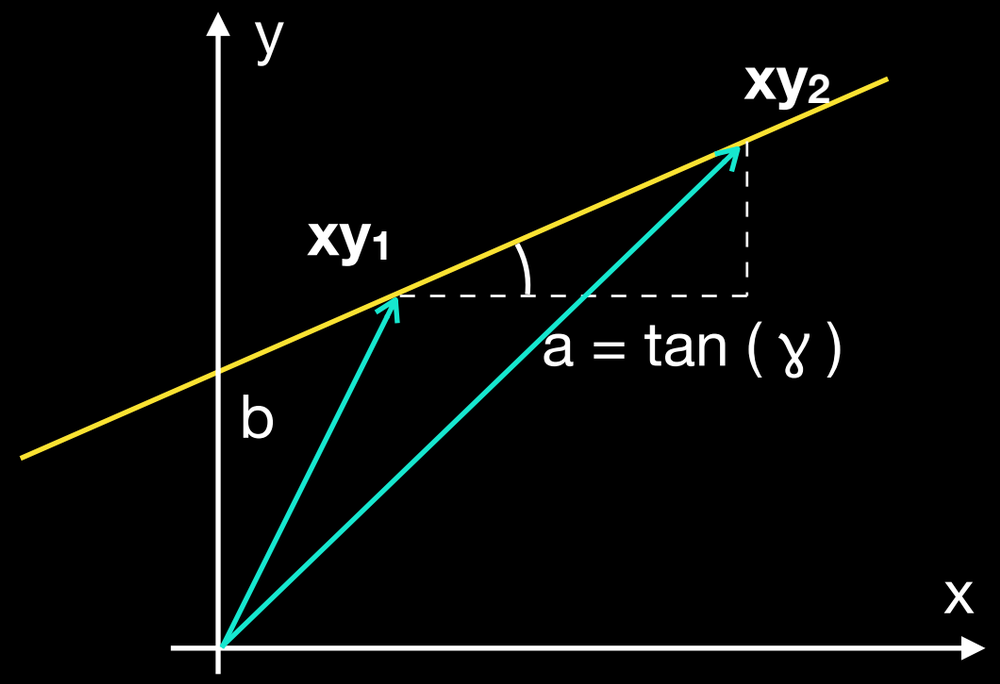
Kinematic interpretation

$$\mathbf{x} = (1-t)\,\mathbf{x}_1 + t\,\mathbf{x}_2$$



y = ax + b

$$\begin{bmatrix} x \\ y \end{bmatrix} = (1-t)\begin{bmatrix} x_1 \\ y_1 \end{bmatrix} + t\begin{bmatrix} x_2 \\ y_2 \end{bmatrix}$$



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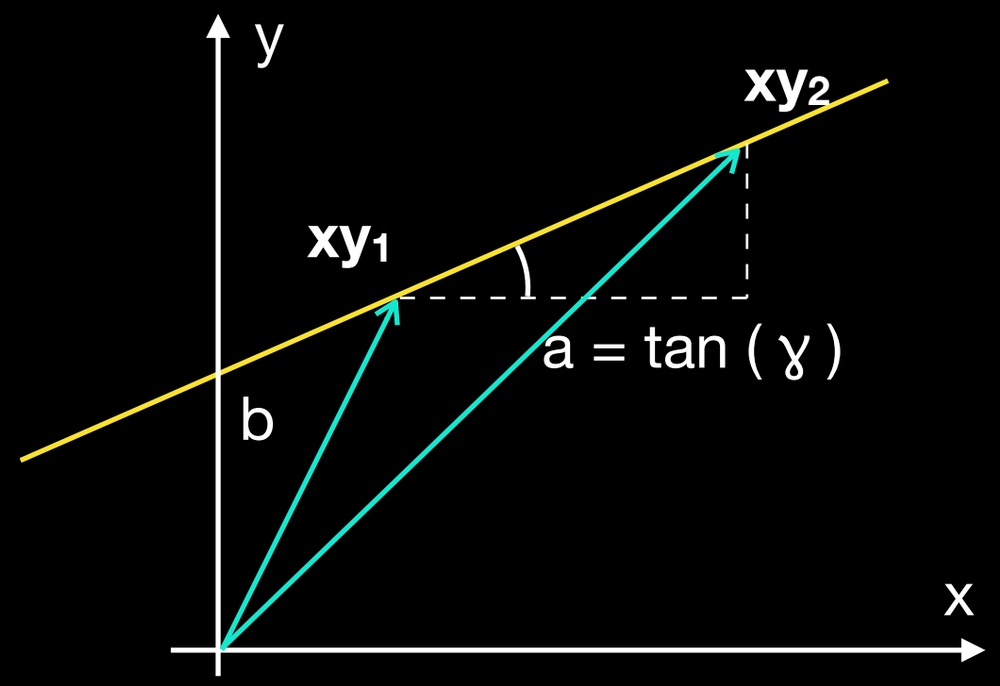
$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} x_1 \\ y_1 \end{bmatrix} + t\begin{bmatrix} x_2 - x_1 \\ y_2 - y_1 \end{bmatrix}$$



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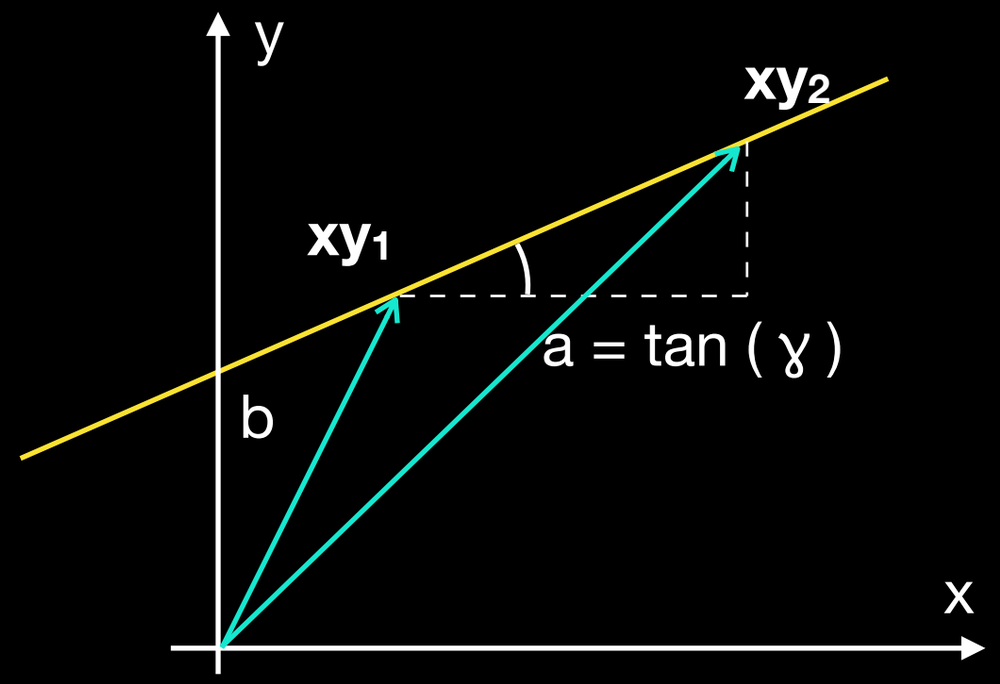
$$\begin{bmatrix} x - x_1 \\ y - y_1 \end{bmatrix} = t\begin{bmatrix} x_2 - x_1 \\ y_2 - y_1 \end{bmatrix}$$



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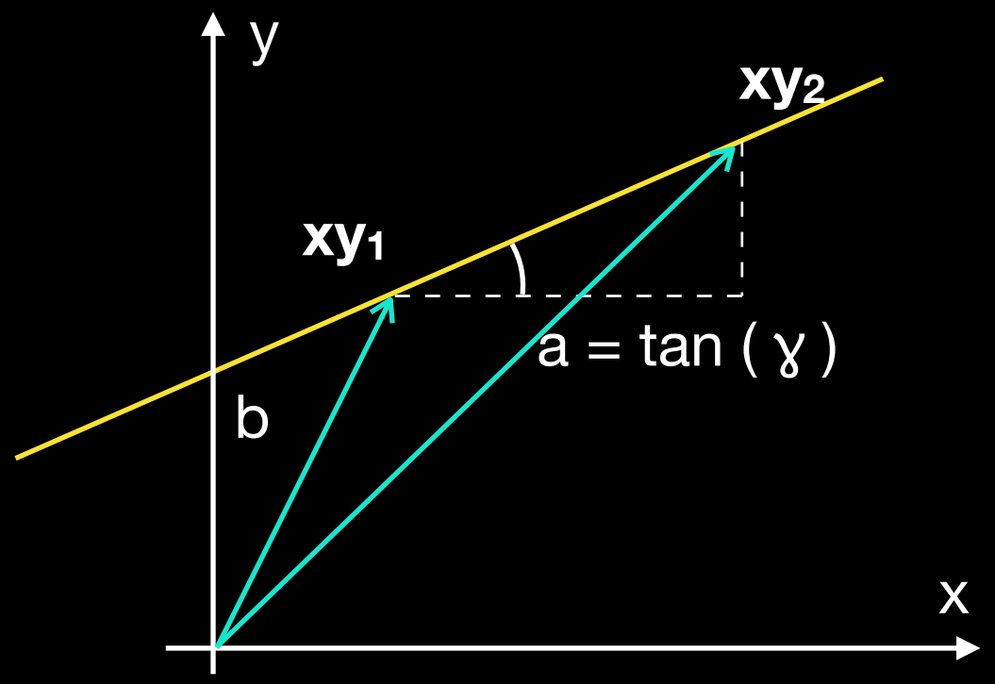
$$\begin{bmatrix} x - x_1 \\ y - y_1 \end{bmatrix} = t\begin{bmatrix} x_2 - x_1 \\ y_2 - y_1 \end{bmatrix}$$

$$\begin{cases} x - x_1 = t(x_2 - x_1) \\ y - y_1 = t(y_2 - y_1) \end{cases}$$



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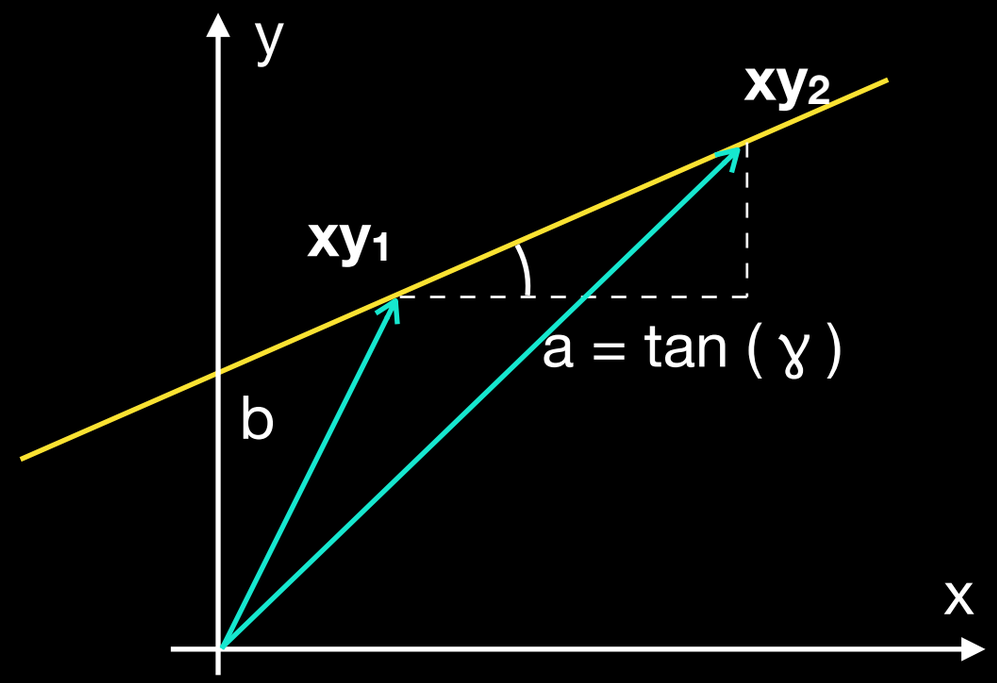
$$\begin{cases} x - x_1 = t(x_2 - x_1) \\ y - y_1 = t(y_2 - y_1) \end{cases}$$

$$t = \frac{x - x_1}{x_2 - x_1} = \frac{y - y_1}{y_2 - y_1}$$



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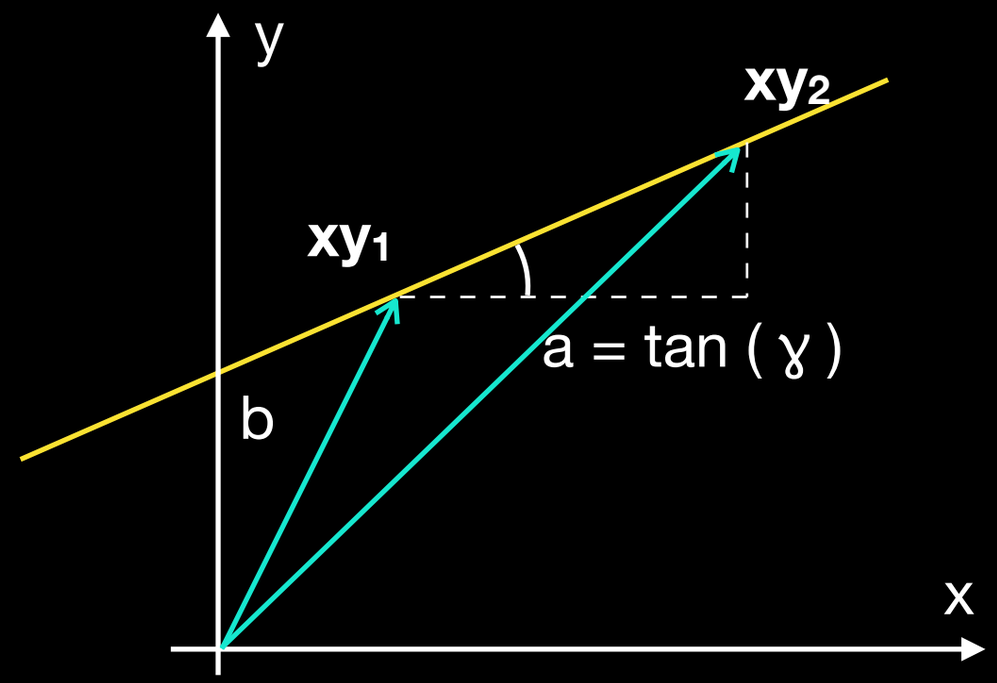

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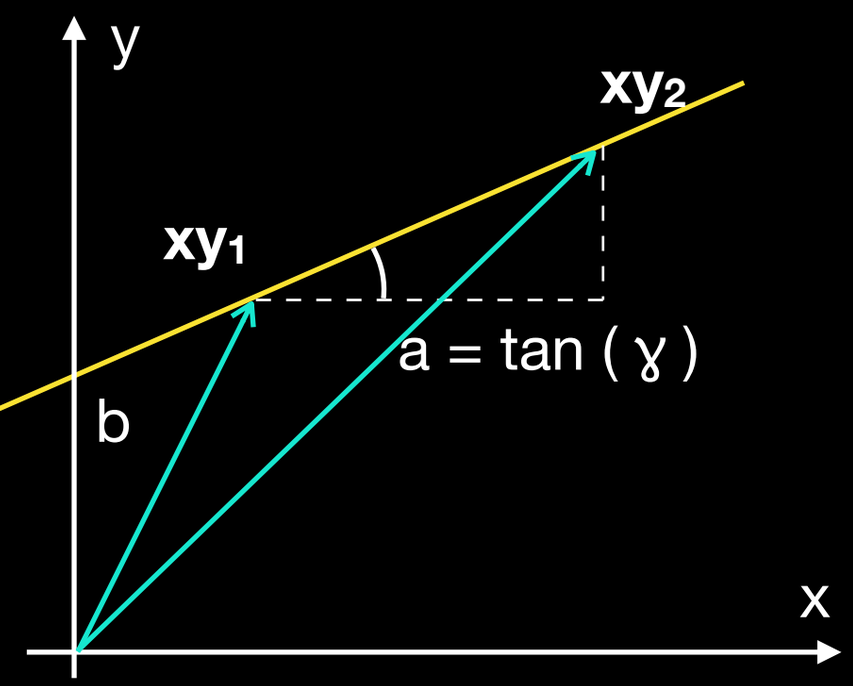
$$y - y_1 = \frac{x - x_1}{x_2 - x_1}(y_2 - y_1) \quad = \tan(\gamma)$$



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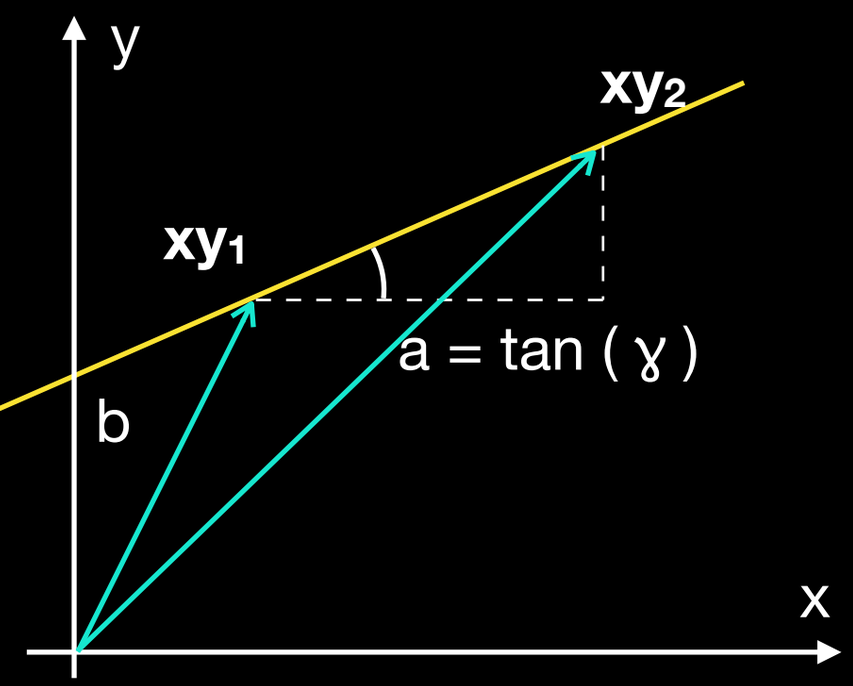

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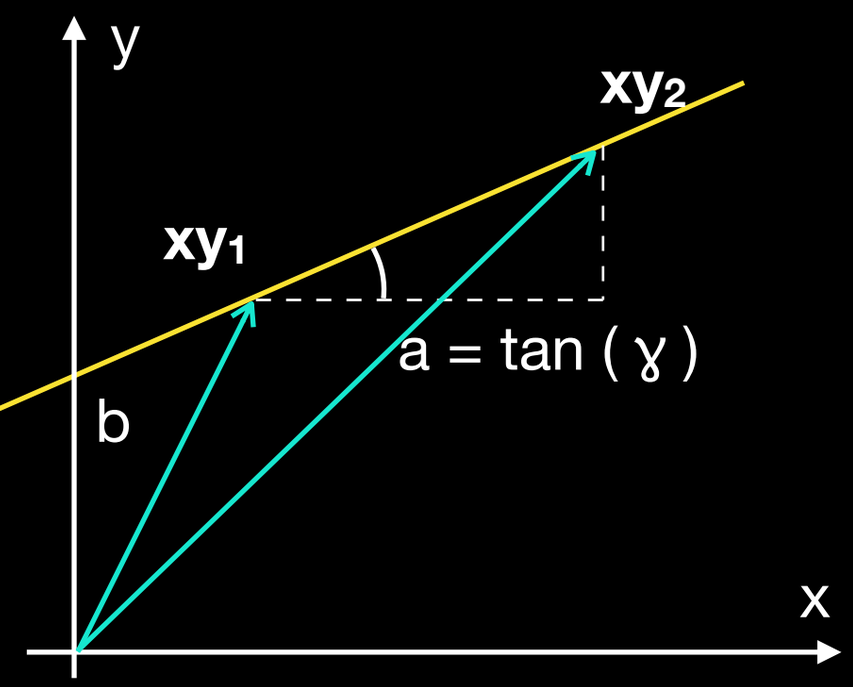
$$y = a(x - x_1) + y_1 = ax + y_1 - ax_1 \quad = b$$



Line equation

$$\mathbf{V} = (1-t)\,\mathbf{V_1} + t\,\mathbf{V_2}$$

$t \in (-\infty, +\infty)$