REPETITION 07/09

Solutions to linear systems

$$\begin{aligned} x_1 - 2x_2 &= -1 \\ -x_1 + 3x_2 &= 3 \end{aligned}$$

system

$\downarrow$

$$\left[\begin{array}{cc|c} 1 & -2 & -1 \\ -1 & 3 & 3 \end{array}\right]$$

augmented matrix

$\downarrow$

$$\left[\begin{array}{cc|c} \vec{a}_1 & \vec{a}_2 & \vec{b} \end{array}\right]$$

$\Rightarrow$ (x_1, x_2) is a solution $\Leftrightarrow$ $\vec{b} = x_1\vec{a}_1 + x_2\vec{a}_2$

„ $\vec{b}$ is a <u>linear combination</u> of $\vec{a}_1$ and $\vec{a}_2$ with <u>weights</u> x_1, x_2 "

Definition (Matrix)

$$A\vec{x} = \left[\vec{a}_1 \dots \vec{a}_n\right] \begin{pmatrix} x_1 \\ \vdots \\ x_n \end{pmatrix} = x_1\vec{a}_1 + x_2\vec{a}_2 + \dots + x_n\vec{a}_n$$

Lecture 08/09 :

- $A\vec{x} = \vec{b}$: Do we have a solution for <u>any</u> $\vec{b}$?
- Find solutions of $A\vec{x} = \vec{0}$ (homogeneous equation)