

3.5.3

$$\begin{cases} x_1 + 2x_2 + 2x_3 = 1 \\ 3x_1 + 4x_2 + 5x_3 = 2 \\ 2x_1 + 2x_3 = 0 \end{cases} \quad A = \begin{pmatrix} 1 & 2 & 2 \\ 3 & 4 & 5 \\ 2 & 0 & 2 \end{pmatrix}$$

$$AX = Y \Leftrightarrow \begin{pmatrix} 1 & 2 & 2 \\ 3 & 4 & 5 \\ 2 & 0 & 2 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}$$

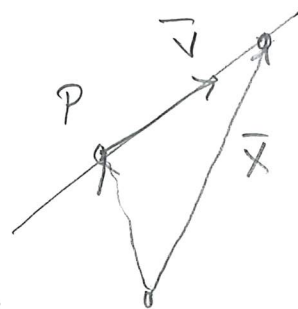
$$\begin{array}{l} \xrightarrow{(-3)} \\ \xrightarrow{(-2)} \end{array} \left(\begin{array}{ccc|c} 1 & 2 & 2 & 1 \\ 3 & 4 & 5 & 2 \\ 2 & 0 & 2 & 0 \end{array} \right) \Leftrightarrow \begin{array}{l} \xrightarrow{(-2)} \\ \xrightarrow{(-2)} \end{array} \left(\begin{array}{ccc|c} 1 & 2 & 2 & 1 \\ 0 & -2 & -1 & -1 \\ 0 & -4 & -2 & -2 \end{array} \right)$$

$$\Leftrightarrow \left(\begin{array}{ccc|c} 1 & 2 & 2 & 1 \\ 0 & 2 & 1 & 1 \\ 0 & 0 & 0 & 0 \end{array} \right) \Leftrightarrow \begin{cases} x_1 + 2x_2 + 2x_3 = 1 \\ 2x_2 + x_3 = 1 \end{cases}$$

$$\begin{cases} x_1 = -1 + 2t \\ x_2 = t \\ x_3 = 1 - 2t, \quad t \in \mathbb{R} \end{cases}$$

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix} + t \begin{pmatrix} 2 \\ 1 \\ -2 \end{pmatrix}$$

$$\vec{x} = \overrightarrow{OP} + t\vec{v}$$



$$A \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 & 2 & 2 \\ 3 & 4 & 5 \\ 2 & 0 & 2 \end{pmatrix} \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix} = \begin{pmatrix} -1 + 0 + 2 \\ -3 + 0 + 5 \\ -2 + 0 + 2 \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}$$

$$A \begin{pmatrix} 2 \\ 1 \\ -2 \end{pmatrix} = t \begin{pmatrix} 1 & 2 & 2 \\ 3 & 4 & 5 \\ 2 & 0 & 2 \end{pmatrix} \begin{pmatrix} 2 \\ 1 \\ -2 \end{pmatrix} = t \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$