

$$\underline{A} \underline{x} = \underline{\lambda} \underline{x}$$

$$\underline{A} \underline{x} - \underline{\lambda} \underline{x} = \underline{0}$$

$$(\underline{A} - \underline{\lambda} \underline{E}) \underline{x} = \underline{0}$$

$$A - \lambda E = 0$$

$$A = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix} \quad \begin{vmatrix} 2-\lambda & 1 \\ 1 & 2-\lambda \end{vmatrix}$$

$$=(2-\lambda)^2 - 1 = \lambda^2 - 4\lambda + 3 = 0$$

$$\lambda_1 = 1$$

$$\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$x_1 + x_2 = 0 \quad x_2 = -x_1 \quad L_{\lambda_1} = \left\{ \begin{pmatrix} t \\ -t \end{pmatrix} \mid t \in \mathbb{R} \right\}$$

$$\lambda_2 = 3$$

$$\begin{pmatrix} -1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$x_1 = x_2 \quad L_{\lambda_2} = \left\{ \begin{pmatrix} t \\ t \end{pmatrix} \mid t \in \mathbb{R} \right\}$$

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ 0 & 0 & 3 \end{pmatrix}$$

$$\begin{vmatrix} 1-\lambda & 1 & 1 \\ 0 & 2-\lambda & 1 \\ 0 & 0 & 3-\lambda \end{vmatrix} = (1-\lambda)(2-\lambda)(3-\lambda)$$

$$\lambda_1 = 1 \quad \lambda_2 = 2 \quad \lambda_3 = 3$$

$$A = \begin{pmatrix} b & a \\ d & b \end{pmatrix}$$

$$(b-\lambda)^2 - ad = b^2 - 2b\lambda + \lambda^2 - ad = \lambda^2 - 2b\lambda + (b^2 - ad) = 0$$

$$D = 4b^2 - 4(b^2 - ad) = 4ad \geq 0$$