

$\lambda_2 = 3$

$$\begin{pmatrix} 0 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 0 \end{pmatrix} \sim \begin{pmatrix} 1 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 1 \end{pmatrix} \sim \begin{pmatrix} 1 & -1 & 0 \\ 0 & 1 & -1 \\ 0 & -1 & 1 \end{pmatrix} \sim$$

$$\sim \begin{pmatrix} 1 & -1 & 0 \\ 0 & 1 & -1 \end{pmatrix}$$

$$\begin{cases} x_2 = x_3 \\ x_1 = x_2 \end{cases} \Rightarrow x_1 = x_2 = x_3 = 1.$$

$$\bar{e}_2 = \frac{1}{\sqrt{3}} (1, 1, 1) = \frac{1}{\sqrt{3}} (\bar{i} + \bar{j} + \bar{k}) \quad \bar{e}_1 \perp \bar{e}_2$$

$$\lambda_3 = 6. \begin{pmatrix} -3 & -1 & 1 \\ -1 & -1 & -1 \\ 1 & -1 & -3 \end{pmatrix} \sim \begin{pmatrix} 1 & -1 & -3 \\ -1 & -1 & -1 \\ -3 & -1 & 1 \end{pmatrix} \sim \begin{pmatrix} 1 & -1 & -3 \\ 0 & -2 & -4 \\ 0 & -4 & -8 \end{pmatrix}$$

$$\sim \begin{pmatrix} 1 & -1 & -3 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{pmatrix} \sim \begin{pmatrix} 1 & -1 & -3 \\ 0 & 1 & 2 \end{pmatrix}$$

$$\begin{cases} x_2 = 0 \\ x_3 = 0 \end{cases} \Rightarrow \begin{cases} x_2 = -2x_3 \\ x_1 = x_2 + 3x_3 \end{cases}$$

$x_3 = 1; \quad x_2 = -2; \quad x_1 = -2 + 3 = 1$

$$e_3 = \frac{1}{\sqrt{6}} (1, -2, 1) \quad \begin{matrix} e_3 \perp e_2 \\ e_3 \perp e_1 \end{matrix}$$

m.o.

$$\begin{cases} e_1 = \frac{1}{\sqrt{2}} (1, 0, -1) \\ e_2 = \frac{1}{\sqrt{3}} (1, 1, 1) \\ e_3 = \frac{1}{\sqrt{6}} (1, -2, 1) \end{cases}$$

(2)