

2) 3

$$e_1 = (0, 2, 3)$$

$$u_1 = (2, 1, 1)$$

$$e_2 = (0, 0, 1)$$

$$u_2 = (1, 1, 1)$$

$$e_3 = (-1, 0, 1)$$

$$u_3 = (0, 0, 1)$$

$$1) p_{e \rightarrow u} = U E^{-1}$$

$$|E| = -1 \cdot 2 \cdot 1 = -2$$

$$E^* = \begin{pmatrix} 0 & -1 & 0 \\ -1 & 2 & -2 \\ 2 & 0 & 0 \end{pmatrix}$$

$$E^{**} = \begin{pmatrix} 0 & -1 & 2 \\ -1 & 3 & 0 \\ 0 & -2 & 0 \end{pmatrix}$$

$$E^{-1} = \begin{pmatrix} 0 & 0,5 & -1 \\ 0,5 & 1,5 & 0 \\ 0 & 1 & 0 \end{pmatrix}$$

$$U \cdot E^{-1} = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 0 & 0,5 & -1 \\ 0,5 & 1,5 & 0 \\ 0 & 1 & 0 \end{pmatrix} = \begin{pmatrix} 0,5 & 0,5 & -2 \\ 0,5 & 1,5 & -1 \\ 0 & 1 & 0 \end{pmatrix}$$

$$2) R_{u \rightarrow e} = E U^T$$

$$|u| = 1$$

$$u^* = \begin{pmatrix} 1 & -1 & 0 \\ -1 & 2 & 0 \\ 0 & -1 & 1 \end{pmatrix}$$

$$u^{*T} = \begin{pmatrix} 1 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & 0 & 1 \end{pmatrix}$$

$$E \cdot U^{-1} = \begin{pmatrix} 0 & 2 & 3 \\ 0 & 0 & 1 \\ -1 & 0 & 5 \end{pmatrix} \cdot \begin{pmatrix} 1 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & 0 & 1 \end{pmatrix} =$$

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