

restart :

with(linalg) :

$R := \text{matrix}(3, 3, [2, -3, 9, 0, 1, -5, 0, 0, 4]);$

$T23 := \text{matrix}\left(3, 3, \left[1, 0, 0, 0, \frac{3}{5}, \frac{4}{5}, 0, -\frac{4}{5}, \frac{3}{5}\right]\right);$

$T13 := \text{matrix}\left(3, 3, \left[\frac{3}{5}, 0, -\frac{4}{5}, 0, 1, 0, \frac{4}{5}, 0, \frac{3}{5}\right]\right);$

$T12 := \text{matrix}\left(3, 3, \left[\frac{3}{5}, -\frac{4}{5}, 0, \frac{4}{5}, \frac{3}{5}, 0, 0, 0, 1\right]\right);$

$A := \text{evalm}(\text{transpose}(T12) \& * \text{transpose}(T13) \& * \text{transpose}(T23) \& * R);$

$A1 := \text{evalm}(T12 \& * A);$

$A2 := \text{evalm}(T13 \& * A1);$

$A3 := \text{evalm}(T23 \& * A2);$

$$\begin{bmatrix} 2 & -3 & 9 \\ 0 & 1 & -5 \\ 0 & 0 & 4 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & \frac{3}{5} & \frac{4}{5} \\ 0 & -\frac{4}{5} & \frac{3}{5} \end{bmatrix}$$

$$\begin{bmatrix} \frac{3}{5} & 0 & -\frac{4}{5} \\ 0 & 1 & 0 \\ \frac{4}{5} & 0 & \frac{3}{5} \end{bmatrix}$$

$$\begin{bmatrix} \frac{3}{5} & -\frac{4}{5} & 0 \\ \frac{4}{5} & \frac{3}{5} & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} \frac{18}{25} & -\frac{27}{125} & -\frac{311}{125} \\ -\frac{24}{25} & \frac{161}{125} & -\frac{877}{125} \\ -\frac{8}{5} & \frac{72}{25} & -\frac{204}{25} \end{bmatrix}$$

$$\begin{bmatrix} \frac{6}{5} & -\frac{29}{25} & \frac{103}{25} \\ 0 & \frac{3}{5} & -\frac{31}{5} \\ -\frac{8}{5} & \frac{72}{25} & -\frac{204}{25} \end{bmatrix}$$

$$\begin{bmatrix} 2 & -3 & 9 \\ 0 & \frac{3}{5} & -\frac{31}{5} \\ 0 & \frac{4}{5} & -\frac{8}{5} \end{bmatrix}$$

$$\begin{bmatrix} 2 & -3 & 9 \\ 0 & 1 & -5 \\ 0 & 0 & 4 \end{bmatrix}$$

(1)

$$\begin{bmatrix} \frac{1}{2}\sqrt{2} & 0 & -\frac{1}{2}\sqrt{2} \\ 0 & 1 & 0 \\ \frac{1}{2}\sqrt{2} & 0 & \frac{1}{2}\sqrt{2} \end{bmatrix}$$

$$\begin{bmatrix} \sqrt{2} - \frac{3}{2}\sqrt{2} + \frac{1}{2} & \frac{9}{2}\sqrt{2} - \frac{9}{2} \\ 0 & \frac{1}{2}\sqrt{2} - \frac{1}{2}\sqrt{2} \\ \sqrt{2} - \frac{3}{2}\sqrt{2} - \frac{1}{2} & \frac{9}{2}\sqrt{2} + \frac{9}{2} \end{bmatrix}$$

(2)