

$$\begin{aligned}
 & \text{[> with(LinearAlgebra) :} \\
 & 1. \\
 & \text{[> } A := \text{Matrix}([[4, 1, 4], [1, 7, 1], [4, 1, 4]]) \\
 & \qquad \qquad \qquad A := \begin{bmatrix} 4 & 1 & 4 \\ 1 & 7 & 1 \\ 4 & 1 & 4 \end{bmatrix} \qquad (1)
 \end{aligned}$$

$$\begin{aligned}
 & B := \text{Matrix}([[2, 2, 0], [0, -1, -1], [7, 0, -1]]) \\
 & \qquad \qquad \qquad B := \begin{bmatrix} 2 & 2 & 0 \\ 0 & -1 & -1 \\ 7 & 0 & -1 \end{bmatrix} \qquad (2)
 \end{aligned}$$

$$\begin{aligned}
 & C := A \cdot B \\
 & \qquad \qquad \qquad C := \begin{bmatrix} 36 & 7 & -5 \\ 9 & -5 & -8 \\ 36 & 7 & -5 \end{bmatrix} \qquad (3)
 \end{aligned}$$

$$\begin{aligned}
 & D = B \cdot A \\
 & \qquad \qquad \qquad D = \begin{bmatrix} 10 & 16 & 10 \\ -5 & -8 & -5 \\ 24 & 6 & 24 \end{bmatrix} \qquad (4)
 \end{aligned}$$

$$\begin{aligned}
 & 2. \\
 & \text{[> Eigenvalues(A)} \\
 & \qquad \qquad \qquad \begin{bmatrix} 0 \\ 9 \\ 6 \end{bmatrix} \qquad (5)
 \end{aligned}$$

$$\begin{aligned}
 & \text{[> Eigenvectors(A)} \\
 & \qquad \qquad \qquad \begin{bmatrix} 0 \\ 9 \\ 6 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 \\ 0 & 1 & -2 \\ 1 & 1 & 1 \end{bmatrix} \qquad (6)
 \end{aligned}$$

$$\begin{aligned}
 & 3. \\
 & \text{[> } P := \text{Matrix}([[1, 2, 3], [3, -2, 1], [4, 1, 1]])
 \end{aligned}$$

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$$P := \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 1 & 1 \end{bmatrix}$$

(7)

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>
MatrixInverse(P)

$$\begin{bmatrix} -\frac{3}{32} & \frac{1}{32} & \frac{1}{4} \\ \frac{1}{32} & -\frac{11}{32} & \frac{1}{4} \\ \frac{11}{32} & \frac{7}{32} & -\frac{1}{4} \end{bmatrix}$$

(8)