

ASSIGNMENTI-D'

Q.

$$T = \begin{bmatrix} [1, 2, 0, 1], \\ [3, 1, 2, 2], \\ [0, 1, 3, 1], \\ [2, 2, 2, 0] \end{bmatrix}$$

$$K_1 = \begin{bmatrix} [1, 0, -1], \\ [-1, 0, -1], \\ [1, 0, -1] \end{bmatrix}$$

$$K_2 = \begin{bmatrix} [0, 1, 0], \\ [0, 1, 0], \\ [0, 1, 0] \end{bmatrix}$$

$$\begin{aligned} H_{out} &= (H - K + 2 P(s)) + I \\ &= (4 - 3 + 0(I)) + I \\ &\doteq 2 \end{aligned}$$

Now,

From Row 1, Col 1.

$$= \begin{bmatrix} 1 & 2 & 0 \\ 3 & 1 & 2 \\ 0 & 1 & 3 \end{bmatrix} \times \begin{bmatrix} 1/0, -1 \\ 1, 0, \\ 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & -1 \\ 1 & 0 & -1 \\ 1 & 0 & -1 \end{bmatrix}$$

$$\begin{aligned} &= (1 \times 1 + 2 \times 0 + 0 \times (-1)) + (3 \times 1 + 1 \times 0 + 2 \times (-1)) + (0 \times 1 + 1 \times 0 + 3 \times (-1)) \\ &\doteq 1 + 1 - 3 \\ &= -1 \end{aligned}$$

From Row 1, Col 2

$$= \begin{bmatrix} 2 & 0 & 1 \\ 1 & 2 & 2 \\ 1 & 3 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & -1 \\ 1 & 0 & -1 \\ 1 & 0 & -1 \end{bmatrix}$$

$$\begin{aligned} &= (2 \times 1 + 0 \times 0 + 1 \times (-1)) + (1 \times 1 + 2 \times 0 + 2 \times (-1)) + (1 \times 1 + 3 \times 0 + 1 \times (-1)) \\ &= 0 \end{aligned}$$

Date:

From Row 2, Col 2

$$= \begin{bmatrix} 3 & 1 & 2 \\ 0 & 1 & 3 \\ 2 & 2 & 2 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & -1 \\ 1 & 0 & -1 \\ 1 & 0 & -1 \end{bmatrix}$$

$$= (3+0-2) + (0+0-3) + (2+0-2)$$

$$= 1$$

From Row 2, Col 2

$$= \begin{bmatrix} 1 & 2 & 2 \\ 1 & 3 & 1 \\ 2 & 2 & 0 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & -1 \\ 1 & 0 & -1 \\ 1 & 0 & -1 \end{bmatrix}$$

$$= (1 \times 1 + 2 \times 0 + 2 \times -1) + (1 \times 1 + 3 \times 0 + 1 \times -1) + (2 \times 1 + 2 \times 0 + 0 \times -1)$$

$$= 1$$

Output:

$$K_1 = \begin{bmatrix} -1 & 0 \\ -2 & 1 \end{bmatrix}$$

Again,

From Row 1, Col 1

$$= \begin{bmatrix} 1 & 2 & 0 \\ 3 & 1 & 2 \\ 0 & 1 & 3 \end{bmatrix} \times \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

$$= (1 \times 0 + 2 \times 1 + 0 \times 0) + (3 \times 0 + 1 \times 1 + 2 \times 0) + (0 \times 0 + 1 \times 1 + 3 \times 0)$$

$$= 2 + 1 + 1$$

$$= 4$$

From Row 1, Col 2.

$$= \begin{bmatrix} 2 & 0 & 1 \\ 1 & 2 & 2 \\ 1 & 3 & 1 \end{bmatrix} \times \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

$$= (2 \times 0 + 0 \times 1 + 1 \times 0) + (1 \times 0 + 2 \times 1 + 2 \times 0) + (1 \times 0 + 3 \times 1 + 1 \times 0)$$

$$= 0 + 2 + 3$$

$$= 5$$

From Row 2, Col 1.

$$= \begin{bmatrix} 3 & 1 & 2 \\ 0 & 1 & 3 \\ 2 & 2 & 2 \end{bmatrix} \times \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

$$= (3 \times 0 + 1 \times 1 + 2 \times 0) + (0 \times 0 + 1 \times 1 + 3 \times 0) + (2 \times 0 + 2 \times 1 + 2 \times 0)$$

$$= 1 + 1 + 2$$

$$= 4$$

From Row 2, Col 2.

$$= \begin{bmatrix} 1 & 2 & 2 \\ 1 & 3 & 1 \\ 2 & 2 & 0 \end{bmatrix} \times \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

$$= (1 \times 0 + 2 \times 1 + 2 \times 0) + (1 \times 0 + 3 \times 1 + 1 \times 0) + (2 \times 0 + 2 \times 1 + 0 \times 0)$$

$$= 2 + 3 + 2$$

$$= 7$$

Output:

$$K_2 = \begin{bmatrix} 4 & 5 \\ 4 & 7 \end{bmatrix}.$$