

SAYISAL ANALİZ
HOMEWORK 2 PART 2

FERHAT ŞİRİN
161044080

$$\underbrace{\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ 0 & 0 & 1 \end{bmatrix}}_A \times \underbrace{\begin{bmatrix} x \\ y \\ 1 \end{bmatrix}}_B = \underbrace{\begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix}}_F$$

$$\begin{array}{l} \overset{x}{\underbrace{\quad}} \overset{y}{\underbrace{\quad}} \\ B[1,2] \rightarrow F[2,2] \\ B[2,1] \rightarrow F[-1,4] \\ B[3,1] \rightarrow F[-4,4] \end{array}$$

$$\begin{array}{l} a_{11}x + a_{12}y + a_{13} = x' \\ a_{21}x + a_{22}y + a_{23} = y' \end{array}$$

$$\begin{array}{l} x=3 \quad y=1 \quad x'=-4 \quad y'=4 \\ 3a_{11} + a_{12} + a_{13} = -4 \\ 3a_{21} + a_{22} + a_{23} = 4 \end{array}$$

$$\begin{array}{l} x=2 \quad y=1 \quad x'=-1 \quad y'=4 \\ 2a_{11} + a_{12} + a_{13} = -1 \\ 2a_{21} + a_{12} + a_{12} = 4 \end{array}$$

$$\begin{array}{l} x=1 \quad y=2 \quad x'=2 \quad y'=2 \\ a_{11} + 2a_{12} + a_{13} = 2 \\ a_{21} + 2a_{22} + a_{21} = 2 \end{array}$$

$$3a_{11} + a_{12} + a_{13} = -4$$

$$\underline{-2a_{11} + a_{12} + a_{13} = -1}$$

$$a_{11} = -3$$

$$3a_{21} + a_{22} + a_{23} = 4$$

$$\underline{-2a_{21} + a_{12} + a_{12} = 4}$$

$$a_{21} = 0$$

$$a_{11} + 2a_{12} + a_{13} = 2$$

$$\underline{-2a_{11} + a_{12} + a_{13} = -1}$$

$$-a_{11} + a_{12} = 3 \quad a_{11} = -3$$

$$a_{12} = 0$$

$$a_{21} + 2a_{22} + a_{23} = 2$$

$$\underline{-2a_{21} + a_{22} + a_{23} = 4}$$

$$-a_{21} + a_{22} = -2 \quad a_{21} = 0$$

$$a_{22} = -2$$

$$3a_{11} + a_{12} + a_{13} = -4 \quad a_{11} = -3 \quad a_{12} = 0$$

$$a_{13} = 5$$

$$3a_{21} + a_{22} + a_{23} = 4 \quad a_{21} = 0 \quad a_{22} = -2$$

$$a_{23} = 6$$

$$A = \begin{bmatrix} -3 & 0 & 5 \\ 0 & -2 & 6 \\ 0 & 0 & 1 \end{bmatrix}$$

We need the inverse of A

A is an upper triangular matrix so

The inverse of A is an upper triangular matrix

$$\underbrace{\begin{bmatrix} -3 & 0 & 5 \\ 0 & -2 & 6 \\ 0 & 0 & 1 \end{bmatrix}}_A \times \underbrace{\begin{bmatrix} u_{11} & u_{12} & u_{13} \\ 0 & u_{22} & u_{23} \\ 0 & 0 & u_{33} \end{bmatrix}}_{A^{-1}} = \underbrace{\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}}_I$$

$$-3u_{11} = 1 \quad u_{11} = -1/3$$

$$-3u_{12} = 0 \quad u_{12} = 0$$

$$-2u_{22} = 1 \quad u_{22} = -1/2$$

$$u_{33} = 1$$

$$-3u_{13} + 5u_{33} = 0 \quad u_{13} = 5/3$$

$$-2u_{23} + 6u_{33} = 0 \quad u_{23} = 3$$

$$A^{-1} = \begin{bmatrix} -\frac{1}{3} & 0 & \frac{5}{3} \\ 0 & -\frac{1}{2} & 3 \\ 0 & 0 & 1 \end{bmatrix}$$