

HW2 - MA232

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I pledge my honor that I have abided by the Stevens Honor System.

Problem 1

$$A = \begin{bmatrix} 2 & 1 & 0 \\ -2 & 0 & 1 \\ 8 & 5 & 3 \end{bmatrix} \quad I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$R_2 = R_2 + R_1$$

$$A_{21} = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 1 & 1 \\ 8 & 5 & 3 \end{bmatrix} \quad E_{21} = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$R_3 = R_3 + 4R_1$$

$$A_{31} = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 3 \end{bmatrix} \quad E_{31} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -4 & 0 & 1 \end{bmatrix}$$

$$E = E_{21} \cdot E_{31} =$$

$$E = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ -4 & 0 & 1 \end{bmatrix}$$

$$E * A =$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ -4 & 0 & 1 \end{bmatrix} \begin{bmatrix} 2 & 1 & 0 \\ -2 & 0 & 1 \\ 8 & 5 & 3 \end{bmatrix} \\ = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 3 \end{bmatrix}$$

Problem 2

$$A = \left[\begin{array}{cccc|cccc} 0 & 0 & 0 & 2 & 1 & 0 & 0 & 0 \\ 0 & 0 & 3 & 0 & 0 & 1 & 0 & 0 \\ 0 & 4 & 0 & 0 & 0 & 0 & 1 & 0 \\ 5 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{array} \right]$$

$$\begin{aligned} R_1 &= R_1 + \frac{1}{5}R_4 \\ R_2 &= R_2 + \frac{1}{4}R_3 \\ R_3 &= R_3 + \frac{1}{3}R_2 \\ R_4 &= R_4 + \frac{1}{2}R_1 \end{aligned}$$

$$\left[\begin{array}{cccc|cccc} 1 & 0 & 0 & 2 & 1 & 0 & 0 & \frac{1}{5} \\ 0 & 1 & 3 & 0 & 0 & 1 & \frac{1}{4} & 0 \\ 0 & 4 & 1 & 0 & 0 & \frac{1}{3} & 1 & 0 \\ 5 & 0 & 0 & 1 & \frac{1}{2} & 0 & 0 & 1 \end{array} \right]$$

$$\begin{aligned} R_4 &= R_4 - 5R_1 \\ R_3 &= R_3 - 4R_2 \\ R_2 &= R_2 - 3R_3 \\ R_1 &= R_1 - 2R_5 \end{aligned}$$

$$\left[\begin{array}{cccc|cccc} 1 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{1}{5} \\ 0 & 1 & 0 & 0 & 0 & 0 & \frac{1}{4} & 0 \\ 0 & 0 & 1 & 0 & 0 & \frac{1}{3} & 0 & 0 \\ 0 & 0 & 0 & 1 & \frac{1}{2} & 0 & 0 & 0 \end{array} \right]$$

$$A^{-1} =$$

$$\left[\begin{array}{cccc} 0 & 0 & 0 & \frac{1}{5} \\ 0 & 0 & \frac{1}{4} & 0 \\ 0 & \frac{1}{3} & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 \end{array} \right]$$

$$B = \left[\begin{array}{cccc|cccc} 3 & 2 & 0 & 0 & 1 & 0 & 0 & 0 \\ 4 & 3 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 6 & 5 & 0 & 0 & 1 & 0 \\ 0 & 0 & 7 & 6 & 0 & 0 & 0 & 1 \end{array} \right]$$

$$R_4 = R_4 - R_3$$

$$\left[\begin{array}{cccc|cccc} 3 & 2 & 0 & 0 & 1 & 0 & 0 & 0 \\ 4 & 3 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 6 & 5 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 & -1 & 1 \end{array} \right]$$

$$R_3 = R_3 - 5R_4$$

$$\left[\begin{array}{cccc|cccc} 3 & 2 & 0 & 0 & 1 & 0 & 0 & 0 \\ 4 & 3 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 6 & -5 \\ 0 & 0 & 1 & 1 & 0 & 0 & -1 & 1 \end{array} \right]$$

$$R_4 = R_4 - R_3$$

$$R_2 = R_2 - R_1$$

$$\left[\begin{array}{cccc|cccc} 3 & 2 & 0 & 0 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 6 & -5 \\ 0 & 0 & 0 & 1 & 0 & 0 & -7 & 6 \end{array} \right]$$

$$R_1 = R_1 - 2R_2$$

$$R_2 = R_2 - R_1$$

$$\left[\begin{array}{cccc|cccc} 1 & 0 & 0 & 0 & 3 & -2 & 0 & 0 \\ 0 & 1 & 0 & 0 & -4 & 3 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 6 & -5 \\ 0 & 0 & 0 & 1 & 0 & 0 & -7 & 6 \end{array} \right]$$

$$B^{-1} =$$

$$\left[\begin{array}{cccc} 3 & -2 & 0 & 0 \\ -4 & 3 & 0 & 0 \\ 0 & 0 & 6 & -5 \\ 0 & 0 & -7 & 6 \end{array} \right]$$

Problem 3