

## HW 2

FIND LU DECOMP OF A, USE LU TO FIND X

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

$$b = \begin{bmatrix} 2 \\ -3 \\ -2 \end{bmatrix}$$

$$\begin{aligned} \overline{M}b &= \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 2 \\ -3 \\ -2 \\ 0 \end{bmatrix} \\ &= \begin{bmatrix} 2 \\ -3 \\ -2 \\ 0 \end{bmatrix} \\ &= \begin{bmatrix} 2 \\ 5/2 \\ 7 \\ -25/8 \end{bmatrix} \\ &= \gamma \end{aligned}$$

$$M_1 A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 4 & 1 & 0 & 0 \\ 0 & 1 & 4 & 1 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 4 & 1 & 0 & 0 \\ 0 & 1 & 4 & 1 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$M_2 M_1 A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 4 & 1 & 0 & 0 \\ 0 & 1 & 4 & 1 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 4 & 1 & 0 & 0 \\ 0 & 1 & 4 & 1 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$M_3 M_2 M_1 A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 4 & 1 & 0 & 0 \\ 0 & 1 & 4 & 1 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 4 & 1 & 0 & 0 \\ 0 & 1 & 4 & 1 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \overline{M}A$$

$$\overline{M}A = \gamma$$

$$\begin{bmatrix} 4 & 1 & 0 & 0 \\ 0 & 1 & 4 & 1 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 2 \\ 5/2 \\ 7 \\ -25/8 \end{bmatrix}$$

$$\begin{cases} 4x_1 + x_2 = 2 \\ 1/4 x_2 + x_3 = 5/2 \\ 8/3 x_3 + x_4 = 7 \\ 29/8 x_4 = -25/8 \end{cases}$$

NOW BACK-SUB  
& SIMPLIFY

S. PHYSICS  
ENORS IN,  
CHEMISTRY  
& MATHEMATICS