

Problem 2-1

$$2x + 3y = 5 \quad (1)$$

$$6x + 15y = 12 \quad (2)$$

a) using elimination \rightarrow multiply (1)
 $\times 3$ to eliminate x

Matrix form:

pivot.

$$\begin{bmatrix} \boxed{2} & 3 \\ 6 & 15 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 12 \end{bmatrix}$$

elimination

\therefore

pivot

$$A = \begin{bmatrix} 2 & 3 \\ 6 & 15 \end{bmatrix} \rightarrow u = \begin{bmatrix} \boxed{2} & 3 \\ 0 & \boxed{1} \end{bmatrix}$$

$$\begin{bmatrix} 6 & 15 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 5 \end{bmatrix}$$

Back substitution

Following the same procedure to find c

$$Ax = c$$

$$\begin{bmatrix} 2 & 3 \\ 0 & 6 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ -3 \end{bmatrix}$$

Then
2nd - 1st
row
(12 - 15)

$$\therefore 0x + 6y = -3$$

$$y = \underline{-1/2}$$

$$\therefore 2x + 3y = 5$$

$$2x + 3(-1/2) = 5$$

$$x = \underline{13/4}$$

Hence just to check x, y

$$\begin{bmatrix} 2 & 3 \\ 6 & 15 \end{bmatrix} \begin{bmatrix} 13/4 \\ -1/2 \end{bmatrix} = \begin{bmatrix} 5 \\ 12 \end{bmatrix}$$

$$6 \left(13/4 \right) + 15 \left(-1/2 \right) = \frac{78 - 30}{4} = 12 \quad \underline{\underline{= 12 \checkmark}}$$

Problem 2.2

[2.3 #29. Introduction to linear Algebra : Strang]

Find the triangular matrix E that reduces "Pascal's matrix" to a

smaller Pascal.

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

Which Matrix U (multiply several E 's) reduces Pascal all the way to I .

$$I = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$E \cdot M = I$$

$$\therefore M = \underline{E^{-1}} \quad \text{inverse Matrix}$$