Chase Jacobs

C2-P8 Find the $PA = LU$ factorization

2.4.2.b

a) $\begin{bmatrix} 1 & 1 & 0 \\ 2 & 1 & -1 \\ -1 & 1 & -1 \end{bmatrix}$ swith $\rightarrow$ $\begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & 0 \\ -1 & 1 & -1 \end{bmatrix}$ $\begin{matrix} R1 \\ R2 \end{matrix}$ $\rightarrow$ $\begin{bmatrix} 2 & 1 & -1 \\ \boxed{1/2} & 1/2 & 1/2 \\ \boxed{-1/2} & 3/2 & -3/2 \end{bmatrix}$ $\rightarrow$ $\begin{bmatrix} 2 & 1 & -1 \\ \boxed{1/2} & 1/2 & 1/2 \\ \boxed{-1} & \boxed{3} & -3 \end{bmatrix}$

$\overset{P}{\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}}$ $\overset{A}{\begin{bmatrix} 1 & 1 & 0 \\ 2 & 1 & -1 \\ -1 & 1 & -1 \end{bmatrix}}$ = $\overset{L}{\begin{bmatrix} 1 & 0 & 0 \\ 1/2 & 1 & 0 \\ -1/2 & 3 & 1 \end{bmatrix}}$ $\begin{bmatrix} 2 & 1 & -1 \\ 0 & 1/2 & 1/2 \\ 0 & 0 & -3 \end{bmatrix}$

b) $\begin{bmatrix} 0 & 1 & 3 \\ 2 & 1 & 1 \\ -1 & -1 & 2 \end{bmatrix}$ $\rightarrow$ $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 3 \\ -1 & -1 & 2 \end{bmatrix}$ $\rightarrow$ $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 3 \\ \boxed{-1/2} & -1/2 & 5/2 \end{bmatrix}$ $\rightarrow$ $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 3 \\ \boxed{-1/2} & \boxed{-1/2} & 4 \end{bmatrix}$

$\overset{P}{\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}}$ $\overset{A}{\begin{bmatrix} 0 & 1 & 3 \\ 2 & 1 & 1 \\ -1 & -1 & 2 \end{bmatrix}}$ = $\overset{L}{\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -1/2 & -1/2 & 1 \end{bmatrix}}$ $\overset{V}{\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 3 \\ 0 & 0 & 4 \end{bmatrix}}$