

#2a reduced

b echelon

c not echelon

d echelon

$$\begin{pmatrix} 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix}$$

$$x_3 = 1$$

$$x_2 + x_3 = 0$$

$$\Rightarrow x_2 = -1$$

$$x_1 + x_2 = 0$$

$$\Rightarrow x_1 = 1$$

$$x_1 = 0$$

$$\#7 \quad \begin{bmatrix} 1 & 3 & 4 & 7 \\ 3 & 9 & 7 & 6 \end{bmatrix} \sim \begin{bmatrix} 3 & 9 & 7 & 6 \\ 1 & 3 & 4 & 7 \end{bmatrix} \begin{matrix} \textcircled{1} \\ \textcircled{2} \end{matrix}$$

$$\sim \begin{bmatrix} 3 & 9 & 7 & 6 \\ 0 & 0 & 5/3 & 5 \end{bmatrix} \begin{matrix} \textcircled{1} \\ \textcircled{2} \end{matrix}$$

$$\sim \begin{bmatrix} 3 & 9 & 0 & -15 \\ 0 & 0 & 5/3 & 5 \end{bmatrix}$$

$$\sim \begin{pmatrix} \textcircled{1} & \boxed{3} & \overset{\text{free}}{0} & -5 \\ 0 & 0 & \textcircled{1} & 3 \end{pmatrix}$$

$$\textcircled{1} \cdot \frac{-1}{3} + \textcircled{2}$$

↓

$$\textcircled{2}$$

$$\textcircled{2} \cdot \frac{-21}{5} + \textcircled{1}$$

scale both

$$\boxed{x_3 = 3}$$

basic

$$x_1 + 3x_2 = -5 \Rightarrow$$

$$x_1 = -5 - 3x_2$$

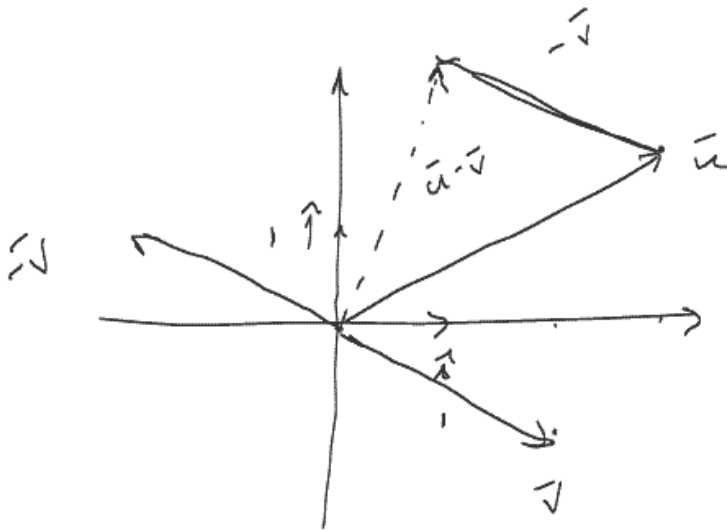
(basic) (free)

x_2 takes any value, which determines x_1 ,

#4 p 37 $\vec{u} = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$ $\vec{v} = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$

$$\vec{u} - \vec{v} =$$

$$\vec{u} + (-\vec{v})$$



$$\begin{aligned} \vec{u} - \vec{v} &= \begin{bmatrix} 3 \\ 2 \end{bmatrix} - \begin{bmatrix} 2 \\ -1 \end{bmatrix} \\ &= \begin{bmatrix} 1 \\ 3 \end{bmatrix} \end{aligned}$$