

ex. (a) <sup>is</sup>  $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$  a linear combination  
of the vectors  $\begin{bmatrix} 1 \\ 0 \\ 3 \end{bmatrix}$  and  $\begin{bmatrix} -1 \\ 1 \\ -3 \end{bmatrix}$ ?

(b) Is  $\begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix}$  a linear combination  
of the vectors  $\begin{bmatrix} 1 \\ 0 \\ 3 \end{bmatrix}$  and  $\begin{bmatrix} -1 \\ 1 \\ -3 \end{bmatrix}$ ?

$$(a) \quad x \begin{bmatrix} 1 \\ 0 \\ 3 \end{bmatrix} + y \begin{bmatrix} -1 \\ 1 \\ -3 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

$$\left[ \begin{array}{cc|c} 1 & -1 & 1 \\ 0 & 1 & 2 \\ 3 & -3 & 3 \end{array} \right] \rightarrow \left[ \begin{array}{cc|c} 1 & 0 & 3 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{array} \right]$$

$$y=2, x=3.$$

$$(b) \quad \left[ \begin{array}{cc|c} 1 & -1 & 2 \\ 0 & 1 & 3 \\ 3 & -3 & 4 \end{array} \right] \rightarrow \left[ \begin{array}{cc|c} 1 & 0 & 5 \\ 0 & 1 & 3 \\ 0 & 0 & -3 \end{array} \right]$$

→ inconsistent

→ Not a linear combination.