Section 2.3: cont'd

Friday, September 28, 2018 1:34 PM

note: consider

$$A = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 1 & -3 \\ 1 & 5 & 15 \end{bmatrix} \xrightarrow{RREF} \left[\begin{array}{cc|c} 1 & 0 & -10/3 \\ 0 & 1 & 11/3 \\ 0 & 0 & 0 \end{array}\right]$$

$c_1 = -10/3$

$c_2 = 11/3$

$$c_1 \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix} + c_2 \begin{bmatrix} 2 \\ 1 \\ 5 \end{bmatrix} = \begin{bmatrix} 4 \\ -3 \\ 15 \end{bmatrix}$$

two different interpretations here:

① the one we're been using:

$$\vec{u}_1 = \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}, \quad \vec{u}_2 = \begin{bmatrix} 2 \\ 1 \\ 5 \end{bmatrix}, \quad \vec{u}_3 = \begin{bmatrix} 4 \\ -3 \\ 15 \end{bmatrix}$$

these vectors are linearly dependent because the RREF has a free variable and if we wish, we can determine the relationship

$$10 \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix} - 11 \begin{bmatrix} 2 \\ 1 \\ 5 \end{bmatrix} + 3 \begin{bmatrix} 4 \\ -3 \\ 15 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

② you could also interpret this as three row vectors:

$$\vec{v}_1 = \begin{bmatrix} 1 & 2 & 4 \end{bmatrix}$$
$$\vec{v}_2 = \begin{bmatrix} 2 & 1 & -3 \end{bmatrix}$$
$$\vec{v}_3 = \begin{bmatrix} 1 & 5 & 15 \end{bmatrix}$$

again, these vectors are LD because there is a row of zeros in the RREF but we can't determine the relationship between the vecters based on the RREF