Math 290 Friday, February 5 Section LC

Property DSAC $(\alpha+\beta)\underset{\sim}{u} \overset{CVE}{=} \alpha\underset{\sim}{u} + \beta\underset{\sim}{u}$

For $1 \le i \le n$

$$[(\alpha+\beta)\underset{\sim}{u}]_i = (\alpha+\beta)[\underset{\sim}{u}]_i$$
$$= \alpha[\underset{\sim}{u}]_i + \beta[\underset{\sim}{u}]_i$$
$$= [\alpha\underset{\sim}{u}]_i + [\beta\underset{\sim}{u}]_i$$
$$= [\alpha\underset{\sim}{u} + \beta\underset{\sim}{u}]_i$$

By Definition CVE, $(\alpha+\beta)\underset{\sim}{u} = \alpha\underset{\sim}{u} + \beta\underset{\sim}{u}$

Mon - SS (sage)

Tue - Problems

Theorem $-3=3$

Proof

$$-3 = 3$$
$$(-3)^2 = 3^2$$
$$9 = 9 \checkmark$$

LC

$$2\begin{bmatrix}1\\3\end{bmatrix}+4\begin{bmatrix}-3\\5\end{bmatrix}=\begin{bmatrix}2\\6\end{bmatrix}+\begin{bmatrix}-12\\20\end{bmatrix}=\begin{bmatrix}-10\\26\end{bmatrix}$$

"vector"

"linear combination"

Ex

$$\begin{aligned}2x_1+3x_2+6x_3&=8\\9x_1+x_2-5x_3&=-2\end{aligned}$$

vector equality

$$\begin{bmatrix}2x_1+3x_2+6x_3\\9x_1+x_2-5x_3\end{bmatrix}=\begin{bmatrix}8\\-2\end{bmatrix}$$

Theorem SLSLC

Solution to makes this vector equality true

$$\begin{bmatrix}2x_1\\9x_1\end{bmatrix}+\begin{bmatrix}3x_2\\x_2\end{bmatrix}+\begin{bmatrix}6x_3\\-5x_3\end{bmatrix}=\begin{bmatrix}8\\-2\end{bmatrix}$$

$$\underbrace{x_1\begin{bmatrix}2\\9\end{bmatrix}+x_2\begin{bmatrix}3\\1\end{bmatrix}+x_3\begin{bmatrix}6\\-5\end{bmatrix}}_{\text{linear combination}}=\begin{bmatrix}8\\-2\end{bmatrix}$$

$\underline{Ex}$ System w/ 5 equations, 7 variables, $\longrightarrow$ RREF

$$\left[\begin{array}{ccccccc|c} 1 & 0 & 6 & 0 & -7 & 5 & 0 & -3 \\ 0 & 1 & 3 & 0 & 9 & -4 & 0 & 2 \\ 0 & 0 & 0 & 1 & 2 & 8 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right]$$

x_1, x_2, x_3, x_7 dependent

$D = \{1, 2, 4, 7\}$

$F = \{3, 5, 6, 8\}$

not a pivot

$\Longrightarrow$ RCLS consistent

x_3 x_5 x_6 free

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \\ x_7 \end{bmatrix} = \begin{bmatrix} -3 - 6x_3 + 7x_5 - 5x_6 \\ 2 - 3x_3 - 9x_5 + 4x_6 \\ x_3 \\ 1 - 0x_3 - 2x_5 - 8x_6 \\ x_5 \\ x_6 \\ 3 - 0x_3 - 0x_5 - 0x_6 \end{bmatrix} = \begin{bmatrix} -3 \\ 2 \\ 0 \\ 1 \\ 0 \\ 0 \\ 3 \end{bmatrix} + x_3 \begin{bmatrix} -6 \\ -3 \\ \boxed{1} \\ -0 \\ \boxed{0} \\ \boxed{0} \\ -0 \end{bmatrix} + x_5 \begin{bmatrix} 7 \\ -9 \\ \boxed{0} \\ -2 \\ \boxed{1} \\ \boxed{0} \\ -0 \end{bmatrix} + x_6 \begin{bmatrix} -5 \\ 4 \\ \boxed{0} \\ -8 \\ \boxed{0} \\ \boxed{1} \\ -0 \end{bmatrix}$$

$\boxed{}$ = "nice pattern of zeros & ones"

VFSLS