

Math 290 Thursday, January 28

Section HSE

$$\begin{aligned} \underline{Ex} \quad & 2x_1 + 3x_2 - 6x_3 = 0 \\ & 5x_1 + x_2 + 8x_3 = 0 \end{aligned} \quad \boxed{\text{homogeneous}}$$

Thu - HSE

Fri - NM

Test PDF

linear @

Deezer.privacyport.com

10 AM Friday

Mon - Problem session

- Writing SLE

Tue - Exam SLE

Ex System, homogeneous, coefficient matrix

$$\begin{bmatrix} -3 & -1 & -4 \\ 1 & -3 & 5 \\ 7 & -1 & -4 \\ -1 & 1 & -2 \end{bmatrix}$$

RREF →

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix} \begin{matrix} 0 \\ 0 \\ 0 \\ 0 \end{matrix}$$

unique solution

solution set

$$\left\{ \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \right\}$$

$$x_1 = x_2 = x_3 = 0$$

↑
Coefficient matrix
(not augmented)

$$\begin{matrix} 0 \\ 0 \\ 0 \\ 0 \end{matrix}$$

Ex homogeneous system, coefficient matrix

$$\begin{bmatrix} -1 & -4 & 7 \\ 6 & 2 & 2 \\ 1 & -2 & 5 \\ 3 & 5 & -7 \end{bmatrix}$$

~~RREF~~
→

$$\begin{bmatrix} \textcircled{1} & 0 & 1 \\ 0 & \textcircled{1} & -2 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

↑
 x_3 free

← $x_1 = -x_3$

← $x_2 = 2x_3$

$$S = \left\{ \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} \right\}$$

$$\left. \begin{matrix} x_1 = -x_3, \\ x_2 = 2x_3 \end{matrix} \right\}$$

infinite solutions

$$= \left\{ \begin{bmatrix} -x_3 \\ 2x_3 \\ x_3 \end{bmatrix} \mid x_3 \in \mathbb{C} \right\} = \left\{ \begin{bmatrix} -a \\ 2a \\ a \end{bmatrix} \mid a \in \mathbb{C} \right\}$$

Null space

homogeneous system

A matrix

$$N(A) = \{ \underline{x} \mid \underline{x} \text{ solution to } LS(A, \underline{0}) \}$$

set of vectors

Ex

$$A = \begin{bmatrix} 2 & 3 & 3 & 5 & -1 \\ 1 & -2 & 0 & 1 & -4 \\ -3 & 1 & 5 & 2 & 7 \end{bmatrix}, N(A) = ?$$

Solve $LS(A, \underline{0})$

A $\xrightarrow{\text{RREF}}$

$$\begin{bmatrix} 0 & 0 & 0 & 1 & -2 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix}$$

x_4, x_5 free

$$N(A) = \left\{ \begin{bmatrix} -x_4 + 2x_5 \\ -x_5 \\ -x_4 \\ x_4 \\ x_5 \end{bmatrix} \mid x_4, x_5 \in \mathbb{C} \right\}$$