Math 290 B, Thursday, April 30 Sections MR

Thu- MR (~~CB~~)
Sage

Fri - Problems

Mon- CB (RQ)
Sage

Tue- Problem ~~Session~~ WRITING

Wed- Exam R

Final Exam - Tue AM
9AM (8 AM?)

Ex $T: M_{22} \to P_2$ $T\left(\begin{bmatrix} a & b \\ c & d \end{bmatrix}\right) = (2a+b+3c-2d) + (5a+3b+7c-4d)x + (a+b+c)x^2$

$B = \left\{ \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \right\}$ $C = \{1, x, x^2\}$ $M^T_{B,C}$?

$\rho_C\left(T\left(\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}\right)\right) = \rho_C\left(2 + 5x + 1x^2\right) = \rho_C\left(2(1) + 5(x) + 1(x^2)\right) = \begin{bmatrix} 2 \\ 5 \\ 1 \end{bmatrix}$

"on sight"

~~site~~

$= \begin{bmatrix} 1 \\ 3 \\ 1 \end{bmatrix}$

~~site~~

$= \begin{bmatrix} 3 \\ 7 \\ 1 \end{bmatrix}$

$M^T_{B,C} = \begin{bmatrix} 2 & 1 & 3 & -2 \\ 5 & 3 & 7 & -4 \\ 1 & 1 & 1 & 0 \end{bmatrix}$

$= \begin{bmatrix} -2 \\ -4 \\ 0 \end{bmatrix}$

$K(T) = ?$ $K(T) \cong N\left(M^T_{B,C}\right)$

$N(M^T_{B,C})$? $M^T_{B,C} \xrightarrow{\text{RREF}} \begin{bmatrix} 1 & 0 & 2 & -2 \\ 0 & 1 & -1 & 2 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ $N(M^T_{B,C}) = \left\langle \left\{ \begin{bmatrix} -2 \\ 1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 2 \\ -2 \\ 0 \\ 1 \end{bmatrix} \right\} \right\rangle$

BASIS

$K(T) \cong N(M^T_{B,C})$

ρ_B^{-1}

$\rho_B^{-1}\left(\begin{bmatrix} -2 \\ 1 \\ 1 \\ 0 \end{bmatrix}\right) = -2\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} + 1\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} + 1\begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix} + 0\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ 1 & 0 \end{bmatrix}$

$\rho_B^{-1}\left(\begin{bmatrix} 2 \\ -2 \\ 0 \\ 1 \end{bmatrix}\right) = \begin{bmatrix} 2 & -2 \\ 0 & 1 \end{bmatrix}$

$K(T) = \left\langle \left\{ \begin{bmatrix} -2 & 1 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 2 & -2 \\ 0 & 1 \end{bmatrix} \right\} \right\rangle$

BASIS

ρ_B^{-1}

Last time:

$M^T_{C,E} = \begin{bmatrix} -5 & -12 & -5 & -12 \\ 10 & 20 & 12 & 16 \\ 0 & 2 & -1 & 4 \end{bmatrix}$

① $K(T) \cong N(M^T_{C,E})$

② $M^T_{B,C}$ vs. $M^T_{C,E}$ related?