Math 290A, Thursday, April 30 Sections MR/CB

Thu - MR (CB?)
Sage

Fri - Problem Session

Mon - CB (RQ)
Sage

Tue - Problem Session

Wed - Exam R

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

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

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

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

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

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

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

"on-sight" ~~site~~ ~~cite~~

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

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

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

$K(T) \cong N(M^T_{B,D})$ $\quad \rho_B^{-1}\left(\begin{bmatrix} -2 \\ 1 \\ 1 \\ 0 \end{bmatrix}\right) = -2\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} + 1\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} + 1\begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix} + 0\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ 1 & 0 \end{bmatrix}$

ρ_B^{-1}

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

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

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