

Math 290

Monday, May 3

Problem Session

Final Exam

Monday, May 10

Th 395, 8-11 AM

Two-hour material

7 pages

Comprehensive, proofs +
office hours - by appointment

Chapter R Exam

- matrix representation - a skill
"on sight"

• No proofs.

CB. T15

$$T: V \rightarrow V$$

T injective $\Leftrightarrow \lambda=0$ not an eigenvalue of T

T not injective $\Leftrightarrow \lambda=0$ is an eigenvalue

(\Rightarrow) T not injective

$$\Rightarrow \exists \underline{x} \neq \underline{y}, T(\underline{x}) = T(\underline{y})$$

then exists

$$T(\underline{x}) = T(\underline{y})$$

\Rightarrow

$$T(\underline{x}) - T(\underline{y}) = \underline{0} \rightarrow T(\underline{x} - \underline{y}) = \underline{0}$$

$$\rightarrow \boxed{T(\underline{x} - \underline{y})} = \underline{0} \quad (\underline{x} - \underline{y}) \neq \underline{0}$$

$\underline{0}$ eigenvalue, for eigenvector $\underline{x} - \underline{y}$.

(\Leftarrow) $\lambda=0$ is an eigenvalue, so let $\underline{x} \neq \underline{0}$ that is eigenvector for $\lambda=0$

$$T(\underline{x}) = \lambda \underline{x} = 0 \underline{x} = \underline{0} = T(\underline{0})$$

So T is not injective.

$$\underline{x} \neq \underline{0}$$

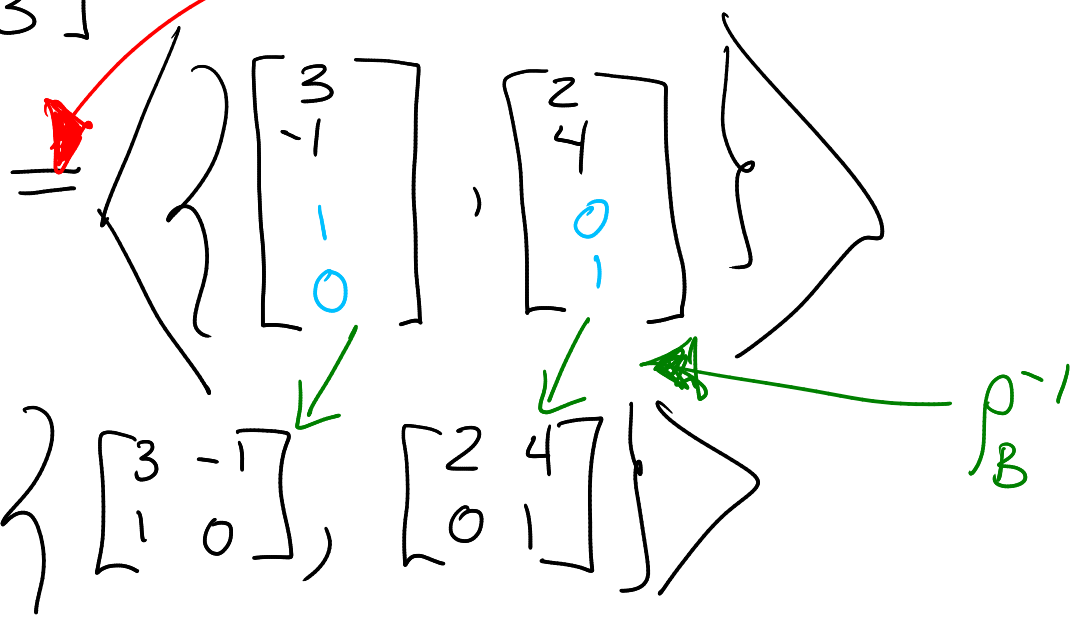
MR. CSI

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

$$B = \left\{ \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \right\} \quad C = \{1, x, x^2\} \quad \underline{K(L)?}$$

$$M_{B,C}^L = \begin{bmatrix} 1 & 2 & 4 & 1 \\ 3 & 0 & 1 & -2 \\ -1 & 1 & 3 & 3 \end{bmatrix} \quad \text{"on sight"}$$

$$K(L) \stackrel{(\rho_B)}{\cong} N(M_{B,C}^L)$$



$$K(L) \stackrel{(\rho_B^{-1})}{=} \left\{ \begin{bmatrix} 3 & -1 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 2 & 4 \\ 0 & 1 \end{bmatrix} \right\}$$