Math 290 Thursday, April 8 Section ME

Fri – Problems

Mon – LT

– Writing Due before class

Tue – Exam E

Theorem UTEC

A similar to upper-triangular T

$\Rightarrow$ diagonal of T has eigenvalues of A (SUT), each is repeated as many times as the algebraic multiplicity.

Proof **Hard.**

Theorem

$$\sum_{i=1}^{k} \alpha_A(\lambda_i) = n$$

Characteristic Polynomial

<u>Defn CP</u> $\quad (x-\lambda_1)^{\alpha_A(\lambda_1)}(x-\lambda_2)^{\alpha_A(\lambda_2)}\cdots(x-\lambda_k)^{\alpha_A(\lambda_k)} = p_A(x)$

<u>Example CPMS3</u>

EE, Example ESMS3

$$F = \begin{bmatrix} -13 & -8 & -4 \\ 12 & 7 & 4 \\ 24 & 16 & 7 \end{bmatrix}$$

$\mathcal{E}_F(3) = \left\langle\left\{\begin{bmatrix} -1 \\ 1 \\ 2 \end{bmatrix}\right\}\right\rangle \qquad \gamma_F(3) = 1 \qquad \gamma_F(3) \le \alpha_F(3)$

$\mathcal{E}_F(-1) = \left\langle\left\{\begin{bmatrix} -2 \\ 3 \\ 0 \end{bmatrix}, \begin{bmatrix} -1 \\ 0 \\ 3 \end{bmatrix}\right\}\right\rangle \qquad \gamma_F(-1) = 2 \qquad \gamma_F(-1) \le \alpha_F(-1)$

Theorem NEM $\Rightarrow$ sum to 3

So $\alpha_F(3) = 1$, $\alpha_F(-1) = 2$ $\qquad p_F(x) = \underset{\substack{\wedge \\ -1}}{} (x-3)^1 (x-(-1))^2$

Theorem DMFE

A diagonalizable $\iff$ $\gamma_A(\lambda) = \alpha_A(\lambda)$ for each eigenvalue λ