Exam 3 Review:

If $A \in F^n_n$ has distinct e-values $\lambda_1, \dots, \lambda_r \in F$ and $Char_A(\lambda) = \prod_{i=1}^{r} (\lambda - \lambda_i)^{k_i}$, k_i = alg. mult. of λ_i for A, but geom. mult. for λ_i is $\dim(A_{\lambda_i}) = g_i$.

Then we know: ① $k_1 + \dots + k_r = n = \deg(Char_A(\lambda))$

② For $1 \le i \le r$, $1 \le g_i \le k_i$

③ $T = T_1 \cup \dots \cup T_r$ is indep set of $g_1 + g_2 + \dots + g_r$ e-vectors for A

④ T is a basis of F^n iff $\langle T \rangle = F^n$ iff $g_1 + \dots + g_r = n$. If <u>any</u> $g_i < k_i$ then T is not a basis of F^n so A is not diag-able.

⑤ $k_i = 1$ [redacted] $\Rightarrow g_i = 1$

Note. $\lambda_i \in F$ is an e-value for $A \in F_n^n$ /300

means $A - \lambda_i I_n$ has rank $< n$

iff $[A - \lambda_i I_n | 0_1^n]$ has non-triv. solution,

$Nul(A - \lambda_i I_n)$ is the e-space A_{λ_i}

T_i is a basis of A_{λ_i}.