HOMEWORK LEC 02 (MATRIX ALGEBRA)

(1) Solve the Lin vec sys $Ax=b$ with

$$A=\begin{bmatrix}1&2&1&0\\-1&0&0&1\\1&0&4&1\\0&1&1&1\end{bmatrix}, \quad b=\begin{bmatrix}-1\\-2\\8\\-1\end{bmatrix}$$

a) Via elimination techniques directly;

b) Partition the system and ~~solve~~ blockwise

(2) Solve the following Matrix Lin Sys

$$AX+XB=C$$

$$A=\begin{bmatrix}1&2\\-1&1\end{bmatrix}, \quad B=\begin{bmatrix}2&0\\1&1\end{bmatrix}, \quad C=\begin{bmatrix}6&-2\\5&1\end{bmatrix}$$

(3) Find the F_i's blocks in terms of A, B, C, D

$$\begin{bmatrix}F_1&F_2\\F_3&F_4\end{bmatrix}=\begin{bmatrix}A&B\\C&D\end{bmatrix}^{-1}$$

(4) Create a nontrivial Lin Sys of 4×4 elements with kronecker structure then solve it, counting the flops:

a) Directly (elimination)

b) the fast method (low complexity)

BACK

(5) show that

$$Tr(AB)=vec^T(A^T)\,vec(B)$$