

Linear Algebra Pre-Test Worksheet

This worksheet is to be done in class. Feel free to discuss with other students and ask the instructor for help. You will need to work on fresh *blank paper* to complete these questions. *No answers* will be provided to these questions; please ask in class or office hours.

$$A = \begin{bmatrix} 1 & 0 & -2 \\ 3 & 4 & 0 \\ 0 & 1 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 5 & -7 \\ 0 & 1 & -1 \end{bmatrix} \quad C = [2 \ 0 \ -2]^T$$

$$D = \begin{bmatrix} 6 & 0 & -2 \\ 3 & 4 & 5 \\ 0 & -1 & -1 \\ 0 & 1 & -1 \end{bmatrix} \quad E = \begin{bmatrix} 1 & -2 & 3 & 6 \\ 0 & 1 & -1 & 1 \\ 2 & 0 & -2 & 3 \\ 5 & -1 & 0 & 1 \end{bmatrix} \quad F = [3 \ 0 \ -2 \ 5 \ -6]^T$$

Question 0.1 Consider the “matrix multiplication table” below.

(Col)(Row)	A	B	C	D	E	F
A						
B						
C						
D						
E						
F						

If a product is not defined, put an \times in that cell of the table. If the product is defined, then compute the product and record your answer.

Question 0.2 Compute the RREF of the matrices A, B, C, D, E , and F . What are the ranks of these matrices?

Question 0.3 Use your answer to Question 0.2 to find the basic solutions to the homogeneous system $M\vec{x} = \vec{0}$ where $M = A, B, C, D, E, F$.

Question 0.4 Find a 3×3 matrix M so that $M \neq 0$, $M^2 \neq 0$, and $M^3 = 0$.

Question 0.5 Show: If a column vector \vec{b} is a sum of multiples of columns of a matrix A then $A\vec{x} = \vec{b}$ has a solution.