

Homework 02 – Linear Algebra

1) Let $A = \begin{bmatrix} 1 & 0 & -1 & 2 \\ 0 & 3 & 1 & -1 \\ 2 & 4 & 0 & 3 \\ -3 & 1 & -1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ 3 & -1 \\ 0 & -2 \\ 4 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 3 & -2 & 0 & 5 \\ 1 & 0 & -3 & 4 \end{bmatrix}$

- a. Does the matrix $D = ABC$ exist? _____ if so, then, $d_{34} =$ _____
 - b. Does the matrix $E = BAC$ exist? _____ if so, then, $e_{22} =$ _____
 - c. Does the matrix $F = BCA$ exist? _____ if so, then, $f_{43} =$ _____
 - d. Does the matrix $G = ACB$ exist? _____ if so, then, $g_{31} =$ _____
 - e. Does the matrix $H = CAB$ exist? _____ if so, then, $h_{21} =$ _____
 - f. Does the matrix $J = CBA$ exist? _____ if so, then, $h_{13} =$ _____
- 2) Given $\mathbf{a} = [-4 \ 0 \ 1 \ 3]$, and $\mathbf{b} = [1 \ 2 \ 5 \ 6]$, calculate the following:
- a. Magnitude for \mathbf{a} _____
 - b. Magnitude for \mathbf{b} _____
 - c. Inner Product $\mathbf{a}\mathbf{b}$ _____
 - d. Projection of \mathbf{a} onto \mathbf{b} _____
- 3) Calculate Inner & Outer Product for $A = \begin{bmatrix} 1 & 2 & 7 & 0 \\ 3 & 0 & -4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & -2 & 0 & 3 \\ 1 & 4 & -2 & 0 \\ 2 & 5 & 8 & -3 \\ 3 & 6 & 9 & 2 \end{bmatrix}$
- 4) Show examples of following matrices & calculate their Determinants: a) Zeroes, b) Ones, c) Identity, d) Upper Triangular, and e) Lower Triangular
- 5) Show a 3x3 matrix and its Transpose matrix.