

Math 2550
HW 2 - Part 1
Matrices

1. Let

$$A = \begin{pmatrix} 3 & 0 \\ -1 & 2 \\ 1 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 4 & -1 \\ 0 & 2 \end{pmatrix} \quad C = \begin{pmatrix} 1 & 4 & 2 \\ 3 & 1 & 5 \end{pmatrix} \quad D = \begin{pmatrix} 1 & 5 & 2 \\ -1 & 0 & 1 \\ 3 & 2 & 4 \end{pmatrix}$$

$$E = \begin{pmatrix} 6 & 1 & 3 \\ -1 & 1 & 2 \\ 4 & 1 & 3 \end{pmatrix} \quad F = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix} \quad G = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \quad I_2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \quad I_3 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

Compute the following (if possible).

(a) $D + E$ (b) $5A$ (c) $2B - C$ (d) $4E - 2D$

(e) $-3(D + 2E)$ (f) $A - A$ (g) $A + B$

2. Using the matrices from problem 1 compute the following (if possible).

(a) $2A^T + C$ (b) $D^T - E^T$ (c) $(D - E)^T$ (d) $B^T + 5C^T$

(e) $\frac{1}{2}C^T - \frac{1}{4}A$ (f) $B - B^T$ (g) $(2E^T - 3D^T)^T$ (h) BI_2

(i) I_2B (j) CI_3 (k) I_3D

3. Using the matrices from problem 1 compute the following (if possible).

(a) AB (b) BA (c) $(3E)D$ (d) $(AB)C$

(e) $A(BC)$ (f) CC^T (g) $(DA)^T$ (h) $(C^TB)A^T$

(i) EF (j) AG (k) BG (l) CG

4. Compute: $\begin{pmatrix} 1 & 0 & 2 & -1 \\ 0 & 1 & 0 & 0 \\ 3 & 1 & 1 & 1 \\ -1 & 2 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 \\ 3 \\ 0 \\ 1 \end{pmatrix}$

5. Compute: $(1 \ 3 \ 0 \ 1) \begin{pmatrix} -1 & 1 \\ 0 & 2 \\ 1 & 3 \\ 1 & 0 \end{pmatrix}$

6. Compute: $\begin{pmatrix} 1 & 0 & 2 & -1 \\ 0 & 1 & 0 & 0 \\ 3 & 1 & 1 & 1 \\ -1 & 2 & 0 & 1 \end{pmatrix} \begin{pmatrix} -1 & 1 \\ 0 & 2 \\ 1 & 3 \\ 1 & 0 \end{pmatrix}$