BRAC University
Course Code: MAT 216
Home work* Sheet # 1

1. Solve the following matrix equation for a , b, c and d .

$$\begin{bmatrix} a-b & b+c \\ 3d+c & 2a-4d \end{bmatrix} = \begin{bmatrix} 8 & 1 \\ 7 & 6 \end{bmatrix}.$$

2. Consider the matrices :

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

$$D = \begin{bmatrix} 1 & 5 & 2 \\ -1 & 0 & 1 \\ 3 & 2 & 4 \end{bmatrix}, \quad E = \begin{bmatrix} 6 & 1 & 3 \\ -1 & 1 & 2 \\ 4 & 1 & 3 \end{bmatrix},$$

Compute the following (where possible)

(a) D + E **(b)** –7C , **(c)** 2B –C, **(d)** –3 (D + 2E) , **(e)** A-A , **(f)** tr (D – 3E).

3. Using the matrices in exercise **(2)** , compute the following (where possible) :

(a) $2A^T + C$, **(b)** $(2E^T - 3D^T)^T$, **(c)** $(D - E)^T$, **(d)** $B^T + 5C^T$, **(e)** $\frac{1}{2}C^T - \frac{1}{4}A$.

4. Using the matrices in exercise **(2)** , compute the following (where possible) .

(a) AB , **(b)** BA , **(c)** (3E) D , **(d)** (AB)C , **(e)** A (BC) , **(f)** $(DA)^T$,

(g) $(C^T B) A^T$, **(h)** tr (DD^T) , **(i)** tr $(4E^T - D)$.

5. Using the matrices in exercise **(2)** , compute the following (where possible) :

(a) $(2D^T - E) A$, **(b)** $(B A^T - 2C)^T$.

1. Let $A = \begin{bmatrix} 1 & -2 & 3 \\ 6 & 7 & -1 \\ -3 & 1 & 4 \end{bmatrix}$,

(a). Find all the minors of A

(b) Find all the cofactors , (c) Find adj (A) ,

(d) Find A^{-1} , Using $A^{-1} = \frac{1}{\det(A)}$ adj (A) .

**These problems are for the students only as home work. Search the reference books for more examples.*

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11. Let $A\begin{bmatrix} 2 & 5 & 5 \\ -1 & -1 & 0 \\ 2 & 4 & 3 \end{bmatrix}$, find A^{-1}.

13. Let $A = \begin{bmatrix} 2 & -3 & 5 \\ 0 & 1 & -3 \\ 0 & 0 & 2 \end{bmatrix}$, find A^{-1} .

(*) Find the inverse of the matrix

$$A = \begin{bmatrix} 1 & 0 & 1 & 2 \\ -1 & 1 & 2 & 1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \end{bmatrix}.$$

(**) Let $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 5 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}$,

then prove that $(AB)^{-1} = B^{-1} . A^{-1}$

(***) Find the inverse of $A = \begin{bmatrix} 1 & -1 & 2 & 1 \\ 3 & 0 & 2 & 2 \\ 2 & 1 & -1 & 1 \\ 1 & 0 & 1 & 1 \end{bmatrix}$.

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