Foundation Algebra for Physical Sciences and Engineering (CELEN036)

Homework 8

1. Find if possible, $A + B, A - B, 2A$ and $-3B$

(i) $\quad A = \begin{pmatrix} 5 & -2 \\ 1 & 3 \end{pmatrix}$
$\qquad\qquad\qquad\qquad\qquad\qquad B = \begin{pmatrix} 4 & 1 \\ -3 & 2 \end{pmatrix}$

(ii) $\quad A = \begin{pmatrix} 6 & -1 \\ 2 & 0 \\ -3 & 4 \end{pmatrix}$
$\qquad\qquad\qquad\qquad\qquad\qquad B = \begin{pmatrix} 3 & 1 \\ -1 & 5 \\ 6 & 0 \end{pmatrix}$

(iii) $\quad A = \begin{pmatrix} 4 & -3 & 2 \end{pmatrix}$
$\qquad\qquad\qquad\qquad\qquad\qquad B = \begin{pmatrix} 7 & 0 & -5 \end{pmatrix}$

(iv) $\quad A = \begin{pmatrix} 3 & -2 & 2 \\ 0 & 1 & -4 \\ -3 & 2 & -1 \end{pmatrix}$
$\qquad\qquad\qquad\qquad\qquad\qquad B = \begin{pmatrix} 4 & 0 \\ 2 & -1 \\ -1 & 3 \end{pmatrix}$

2. If $A = \begin{pmatrix} 4 & 0 \\ -8 & 16 \end{pmatrix}$, $\quad B = \begin{pmatrix} 9 & -3 \\ 12 & 0 \end{pmatrix}$, $\quad$ and $C = \begin{pmatrix} x & y \\ z & w \end{pmatrix}$, $\quad$ find C for the matrix equation.

(i) $\quad 2C = A$
$\qquad\qquad\qquad\qquad\qquad\qquad$ (ii) $\quad A + C = B$

3. Find, if possible. AB and BA.

(i) $\quad A = \begin{pmatrix} 2 & 6 \\ 3 & -4 \end{pmatrix}$
$\qquad\qquad\qquad\qquad\qquad\qquad B = \begin{pmatrix} 5 & -2 \\ 1 & 7 \end{pmatrix}$

(ii) $\quad A = \begin{pmatrix} 4 & -3 & 1 \\ -5 & 2 & 2 \end{pmatrix}$
$\qquad\qquad\qquad\qquad\qquad\qquad B = \begin{pmatrix} 2 & 1 \\ 0 & 1 \\ -4 & 7 \end{pmatrix}$

4. Let $A = \begin{pmatrix} 1 & 2 \\ 0 & -3 \end{pmatrix}$, $\quad B = \begin{pmatrix} 2 & -1 \\ 3 & 1 \end{pmatrix}$, $\quad$ and $C = \begin{pmatrix} 3 & 1 \\ -2 & 0 \end{pmatrix}$. $\quad$ Verify the statement.

(i) $\quad (A + B)(A - B) \neq A^2 - B^2$, where $A^2 = AA$ and $B^2 = BB$

(ii) $\quad A(B + C) = AB + AC$

5. Express the following systems of equations in the form: $AX = B$, and find x and y using $X = A^{-1}B$.

(i) $\begin{cases} 3x + 2y = -3 \\ 5x + 3y = -4 \end{cases}$

(ii) $\begin{cases} x + y = 17 \\ 2x - y = 10 \end{cases}$

(iii) $\begin{cases} 2x - y = 10 \\ x + 3y = -2 \end{cases}$

(iv) $\begin{cases} x + 2y = 15 \\ 3x - y = 10 \end{cases}$

(v) $\begin{cases} 3x - y = 3 \\ x + y = 5 \end{cases}$