Problems of Matrix calculations

1) Calculate **a)** $A^t + B$, **b)** $5A - B^t$.

Where $A = \begin{pmatrix} 7 & 3 & 7 \\ -6 & 8 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -7 \\ 2 & 7 \\ -2 & 4 \end{pmatrix}$

2) Find out **a)** $A - B$, **b)** $4A + B$, **c)** $A + B^t$.

Where $A = \begin{pmatrix} -6 & -7 & 9 \\ 3 & -6 & 6 \\ 2 & -5 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 7 & 7 & 8 \\ 3 & -4 & 5 \\ 7 & -6 & -3 \end{pmatrix}$

3) Calculate **a)** $A \cdot B$, **b)** A^2, **c)** $A \cdot B \cdot C$.

Where $A = \begin{pmatrix} 6 & 5 \\ 3 & 0 \end{pmatrix}$, $B = \begin{pmatrix} -1 & -4 \\ -5 & 7 \end{pmatrix}$ and $C = \begin{pmatrix} 0 & -8 \\ 2 & 4 \end{pmatrix}$

4) Calculate **a)** $A \cdot B$, **b)** $B \cdot A$.

Where $A = \begin{pmatrix} -8 & 7 \\ -5 & -2 \\ -7 & 9 \end{pmatrix}$ and $B = \begin{pmatrix} -4 & 3 & 0 \\ 3 & -5 & -5 \end{pmatrix}$

5) Solve for X matrix the following matricial equations:

      a) $A\,B\,X = C$,   **b)** $X\,A^{-1} + B = C$,   **c)** $8X^t + B = C$

6) Solve for X matrix the following matricial equations:

      a) $A\,X + 6X = B$,   **b)** $A\,X^{-1} + B = C$,   **c)** $X^t\,A + B = C$

7) Solve the matricial equation $A \cdot X - B = C$.

Where $A = \begin{pmatrix} 5 & -5 \\ 1 & -8 \end{pmatrix}$, $B = \begin{pmatrix} 7 & 7 \\ -6 & 2 \end{pmatrix}$ and $C = \begin{pmatrix} 13 & 8 \\ -25 & -34 \end{pmatrix}$

8) Solve the matricial equation $A \cdot X + B = C$.

Where $A = \begin{pmatrix} 3 & 0 \\ 6 & 8 \end{pmatrix}$, $B = \begin{pmatrix} 5 & -9 & -7 \\ 0 & -9 & 2 \end{pmatrix}$ and $C = \begin{pmatrix} 26 & -3 & 2 \\ 90 & 27 & -12 \end{pmatrix}$

9) Solve the following system of matricial equations:

$\left. \begin{matrix} 2X + 2Y = A \\ 4X - 4Y = B \end{matrix} \right\}$, where $A = \begin{pmatrix} 18 & 14 \\ -2 & 32 \end{pmatrix}$ and $B = \begin{pmatrix} -4 & -20 \\ -52 & 0 \end{pmatrix}$

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Answers:

1)   **a)** $\begin{pmatrix} 9 & -13 \\ 5 & 15 \\ 5 & 5 \end{pmatrix}$,   **b)** $\begin{pmatrix} 33 & 13 & 37 \\ -23 & 33 & 1 \end{pmatrix}$

2)   **a)** $\begin{pmatrix} -13 & -14 & 1 \\ 0 & -2 & 1 \\ -5 & 1 & 9 \end{pmatrix}$,   **b)** $\begin{pmatrix} -17 & -21 & 44 \\ 15 & -28 & 29 \\ 15 & -26 & 21 \end{pmatrix}$,   **c)** $\begin{pmatrix} 1 & -4 & 16 \\ 10 & -10 & 0 \\ 10 & 0 & 3 \end{pmatrix}$

3)   **a)** $\begin{pmatrix} -31 & 11 \\ -3 & -12 \end{pmatrix}$,   **b)** $\begin{pmatrix} 51 & 30 \\ 18 & 15 \end{pmatrix}$,   **c)** $\begin{pmatrix} 22 & 292 \\ -24 & -24 \end{pmatrix}$

4)   **a)** $\begin{pmatrix} 53 & -59 & -35 \\ 14 & -5 & 10 \\ 55 & -66 & -45 \end{pmatrix}$,   **b)** $\begin{pmatrix} 17 & -34 \\ 36 & -14 \end{pmatrix}$

5)   **a)** $X = (A\,B)^{-1}\,C,$ **b)** $X = (C - B)\,A,$ **c)** $X = (C - B)^{t}\,/\,8$

6)   **a)** $X = (A + 6I)^{-1}\,B,$ **b)** $X = (C - B)^{-1}\,A,$ **c)** $X = [(C - B)\,A^{-1}]^{t}$

7) $X = \begin{pmatrix} 9 & 8 \\ 5 & 5 \end{pmatrix}$

8) $X = \begin{pmatrix} 7 & 2 & 3 \\ 6 & 3 & -4 \end{pmatrix}$

9) $X = \begin{pmatrix} 4 & 1 \\ -7 & 8 \end{pmatrix}$ and $Y = \begin{pmatrix} 5 & 6 \\ 6 & 8 \end{pmatrix}$