Matrix operations – Homework

Exercise 1 Consider the matrices A, B, C and D below:

$$A = \begin{pmatrix} 4 & -1 & 0 \\ 1 & 5 & -3 \end{pmatrix} \quad B = \begin{pmatrix} 0 & 3 & -2 \\ 1 & 1 & 4 \end{pmatrix} \quad C = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 3 & 10 \\ 4 & 0 & 4 \end{pmatrix} \quad D = \begin{pmatrix} 1 \\ -2 \\ 7 \end{pmatrix}$$

Compute the following matrices if they exist.

$$3A - 2B,\ AD,\ CB,\ CD,\ AC + BC,\ (A + B)C$$

Exercise 2 Compute the following determinants.

$$\begin{vmatrix} -8 & 2 \\ 1 & 0 \end{vmatrix} \qquad \begin{vmatrix} 2 & 3 & 1 \\ 0 & 2 & -1 \\ 1 & 2 & 3 \end{vmatrix} \qquad \begin{vmatrix} 1 & 2 & -5 \\ -1 & 1 & -4 \\ 3 & 5 & -12 \end{vmatrix} \qquad \begin{vmatrix} 1 & 2 & 3 \\ -1 & 0 & 3 \\ 8 & 2 & 1 \end{vmatrix}$$

$$\begin{vmatrix} 3 & 2 & 1 & 0 \\ 1 & -1 & 0 & 4 \\ 2 & 0 & -1 & -2 \\ 1 & 2 & 3 & 4 \end{vmatrix} \qquad \begin{vmatrix} 0 & 1 & 2 & 0 \\ 1 & 2 & 3 & 0 \\ 1 & 3 & 5 & 0 \\ 1 & 2 & 3 & 1 \end{vmatrix} \qquad \begin{vmatrix} -1 & 0 & 2 & 3 \\ 2 & 1 & 1 & 4 \\ -2 & 0 & 3 & 1 \\ 4 & 1 & 1 & 5 \end{vmatrix} \qquad \begin{vmatrix} 0 & 2 & 0 & -1 \\ 3 & 8 & 1 & 1 \\ 1 & 0 & -3 & 4 \\ 0 & 7 & 2 & -1 \end{vmatrix}$$

Solutions:
Exercise 1

$$3A - 2B = \begin{pmatrix} 12 & -9 & 4 \\ 1 & 13 & -17 \end{pmatrix} \quad AD = \begin{pmatrix} 6 \\ -30 \end{pmatrix} \quad CB : \text{the product doesn't exist}$$

$$CD = \begin{pmatrix} 11 \\ 63 \\ 32 \end{pmatrix} \qquad AC + BC = (A + B)C = \begin{pmatrix} -2 & 2 & 16 \\ 2 & 16 & 66 \end{pmatrix}$$

Exercise 2 Determinants: -2, 11, 0, 38, -12, 0, -13, 78