Homework 3

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Exercise 1

For all parts, $A = \begin{bmatrix} 1 & -2 & 0 \\ 3 & 2 & -1 \\ -2 & 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -2 & 3 \\ -1 & 5 & 0 \\ 6 & 1 & 2 \end{bmatrix}$.

Part (a): $2A = \begin{bmatrix} 2 & -4 & 0 \\ 6 & 4 & -2 \\ -4 & 2 & 6 \end{bmatrix}$ and so we add B to get

$$2A + B = \begin{bmatrix} 6 & -6 & 3 \\ 5 & 9 & -2 \\ 2 & 3 & 8 \end{bmatrix}$$

Part (b): $-4B = \begin{bmatrix} -16 & 8 & -12 \\ 4 & 4 & 0 \\ -24 & -4 & -8 \end{bmatrix}$ and $A - 4B = A + (-4B) =$

$$\begin{bmatrix} -15 & 6 & -12 \\ 7 & 6 & -1 \\ -26 & -3 & -5 \end{bmatrix}$$

Part (c): $\begin{bmatrix} 1 & -2 & 0 \\ 3 & 2 & -1 \\ -2 & 1 & 3 \end{bmatrix} \times \begin{bmatrix} 4 & -2 & 3 \\ -1 & 5 & 0 \\ 6 & 1 & 2 \end{bmatrix} = \begin{pmatrix} 6 & -12 & 3 \\ 4 & 3 & 7 \\ 9 & 12 & 0 \end{pmatrix}$

Part (d): $\begin{bmatrix} 1 & -2 & 0 \\ 3 & 2 & -1 \\ -2 & 1 & 3 \end{bmatrix} \times \begin{bmatrix} 4 & -2 & 3 \\ -1 & 5 & 0 \\ 6 & 1 & 2 \end{bmatrix} = \begin{pmatrix} -8 & -9 & 11 \\ 14 & 12 & -5 \\ 5 & -8 & 5 \end{pmatrix}$

Exercise 6

Part (a): $(AB) = \begin{pmatrix} 6 & -5 & -7 \\ 1 & 9 & 1 \\ -1 & -2 & 8 \end{pmatrix}$ and $(AB)C = \begin{pmatrix} 7 & -11 & -3 \\ 11 & 20 & 17 \\ -4 & 3 & -12 \end{pmatrix}$

$(BC) = \begin{pmatrix} 5 & 3 & 3 \\ -1 & 7 & 3 \\ 2 & 3 & -2 \end{pmatrix}$ and $A(BC) = \begin{pmatrix} 7 & -11 & -3 \\ 11 & 20 & 17 \\ -4 & 3 & -12 \end{pmatrix}$

Part (c): $A(B+C) = \begin{pmatrix} 6 & -8 & -11 \\ 9 & 15 & 6 \\ -5 & -1 & 5 \end{pmatrix}$ and $AB = \begin{pmatrix} 6 & -5 & -7 \\ 1 & 9 & 1 \\ -1 & -2 & 8 \end{pmatrix}$

and $AC = \begin{pmatrix} 0 & -3 & -4 \\ 8 & 6 & 5 \\ -4 & 1 & -3 \end{pmatrix}$ so $AB + AC = \begin{pmatrix} 6 & -8 & -11 \\ 9 & 15 & 6 \\ -5 & -1 & 5 \end{pmatrix}$ and we are done.