Matrix algebra – addition and multiplication

Exercise 2.9

Compute the products AB and BA, if possible, when A and B are, respectively

a. $A = \begin{pmatrix} 0 & -2 \\ 3 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 4 \\ 1 & 5 \end{pmatrix}$

b. $A = \begin{pmatrix} 8 & 3 & -2 \\ 1 & 0 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -2 \\ 4 & 3 \\ 1 & -5 \end{pmatrix}$

c. $A = \begin{pmatrix} -1 & 0 \\ 2 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & 1 \\ -1 & 1 \\ 0 & 2 \end{pmatrix}$

d. $A = \begin{pmatrix} 0 \\ -2 \\ 4 \end{pmatrix}$ and $B = \begin{pmatrix} 0 & -2 & 3 \end{pmatrix}$

Solution Exercise 2.9

a. $AB = \begin{pmatrix} -2 & -10 \\ -2 & 17 \end{pmatrix}$ and $BA = \begin{pmatrix} 12 & 6 \\ 15 & 3 \end{pmatrix}$

b. $AB = \begin{pmatrix} 26 & 3 \\ 6 & -22 \end{pmatrix}$ and $BA = \begin{pmatrix} 14 & 6 & -12 \\ 35 & 12 & 4 \\ 3 & 3 & -22 \end{pmatrix}$

c. $AB =$ "cannot be determined" and $BA = \begin{pmatrix} -1 & 4 \\ 3 & 4 \\ 4 & 8 \end{pmatrix}$

d. $AB = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 4 & -6 \\ 0 & -8 & 12 \end{pmatrix}$ and $BA = 16$