

Problem 5

If $\mathbf{A} = \begin{pmatrix} 3 & 2 & -1 \\ 2 & -1 & 2 \\ 1 & 2 & 1 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 2 & 1 & -1 \\ -2 & 3 & 3 \\ 1 & 0 & 2 \end{pmatrix}$, verify that $2(\mathbf{A} + \mathbf{B}) = 2\mathbf{A} + 2\mathbf{B}$.

Solution

$$\mathbf{A} + \mathbf{B} = \begin{pmatrix} 5 & 3 & -2 \\ 0 & 2 & 5 \\ 2 & 2 & 3 \end{pmatrix} \rightarrow 2(\mathbf{A} + \mathbf{B}) = \begin{pmatrix} 10 & 6 & -4 \\ 0 & 4 & 10 \\ 4 & 4 & 6 \end{pmatrix}$$

$$\begin{aligned} 2\mathbf{A} + 2\mathbf{B} &= 2 \begin{pmatrix} 3 & 2 & -1 \\ 2 & -1 & 2 \\ 1 & 2 & 1 \end{pmatrix} + 2 \begin{pmatrix} 2 & 1 & -1 \\ -2 & 3 & 3 \\ 1 & 0 & 2 \end{pmatrix} \\ &= \begin{pmatrix} 6 & 4 & -2 \\ 4 & -2 & 4 \\ 2 & 4 & 2 \end{pmatrix} + \begin{pmatrix} 4 & 2 & -2 \\ -4 & 6 & 6 \\ 2 & 0 & 4 \end{pmatrix} \\ &= \begin{pmatrix} 10 & 6 & -4 \\ 0 & 4 & 10 \\ 4 & 4 & 6 \end{pmatrix} \end{aligned}$$