Additional exercises: Chapter 3,
Linear Algebra and Probability for Computer Science Applications

If you are not familiar with matrix operations, do these computations by hand and then check your answer in MATLAB. This may seem like busy work, but there is really no other way to get a feel for what these mathematical operations do.

1.

$$\begin{bmatrix} 2 & 3 \\ -1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 \\ -4 \end{bmatrix}$$

2.

$$\begin{bmatrix} 1 & -4 \end{bmatrix} \cdot \begin{bmatrix} 2 & 3 \\ -1 & 1 \end{bmatrix}$$

3.

$$\begin{bmatrix} 3 & -1 & 2 \end{bmatrix} \cdot \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

4.

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \cdot \begin{bmatrix} 3 & -1 & 2 \end{bmatrix}$$

5.

$$\begin{bmatrix} 2 & 3 & -1 \\ -1 & 1 & 2 \end{bmatrix} \cdot \begin{bmatrix} 1 \\ -4 \\ 2 \end{bmatrix}$$

6.

$$\begin{bmatrix} 1 & 3 \end{bmatrix} \cdot \begin{bmatrix} 2 & 3 & -1 \\ -1 & 1 & 2 \end{bmatrix}$$

7.

$$\begin{bmatrix} 2 & 3 \\ -1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & -2 \\ -4 & 3 \end{bmatrix}$$

8.

$$\begin{bmatrix} 1 & -2 \\ -4 & 3 \end{bmatrix} \cdot \begin{bmatrix} 2 & 3 \\ -1 & 1 \end{bmatrix}$$

9.

$$\begin{bmatrix} 2 & 3 \\ -1 & 1 \\ 0 & 4 \end{bmatrix} \cdot \begin{bmatrix} 1 & -2 & 0 \\ -4 & 3 & 1 \end{bmatrix}$$

10.

$$\begin{bmatrix} 1 & -2 & 0 \\ -4 & 3 & 1 \end{bmatrix} \cdot \begin{bmatrix} 2 & 3 \\ -1 & 1 \\ 0 & 4 \end{bmatrix}$$

11. Verify by multiplying out:

$$\left(\begin{bmatrix} 1 & -2 & 0 \\ -4 & 3 & 1 \end{bmatrix} \cdot \begin{bmatrix} 2 & 3 \\ -1 & 1 \\ 0 & 4 \end{bmatrix} \right) \cdot \begin{bmatrix} -1 & 2 \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} 1 & -2 & 0 \\ -4 & 3 & 1 \end{bmatrix} \cdot \left(\begin{bmatrix} 2 & 3 \\ -1 & 1 \\ 0 & 4 \end{bmatrix} \cdot \begin{bmatrix} -1 & 2 \\ 3 & 2 \end{bmatrix} \right)$$