

Compute the following matrix products, if possible:

a.

$$\begin{bmatrix} 1 & 2 \\ 4 & 5 \\ 7 & 8 \end{bmatrix} \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

note that the dimensions are 3×2 and 3×3 so is not possible to compute

b.

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

note that the dimensions are 3×3 and 3×3 so is indeed possible to compute

$$\begin{bmatrix} 1+3 & 1+2 & 2+3 \\ 4+6 & 4+5 & 5+6 \\ 7+9 & 7+8 & 8+9 \end{bmatrix}$$

$$\begin{bmatrix} 4 & 3 & 5 \\ 10 & 9 & 11 \\ 16 & 15 & 17 \end{bmatrix}$$

c.

$$\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

note that the dimensions are 3×3 and 3×3 so is indeed possible to compute

$$\begin{bmatrix} 1+4 & 2+5 & 3+6 \\ 4+7 & 5+8 & 6+9 \\ 1+7 & 2+8 & 3+9 \end{bmatrix}$$

$$\begin{bmatrix} 5 & 7 & 9 \\ 11 & 13 & 15 \\ 8 & 10 & 12 \end{bmatrix}$$

d.

$$\begin{bmatrix} 1 & 2 & 1 & 2 \\ 4 & 1 & -1 & -4 \end{bmatrix} \begin{bmatrix} 0 & 3 \\ 1 & -1 \\ 2 & 1 \\ 5 & 2 \end{bmatrix}$$

note that the dimensions are 2×4 and 4×2 so is indeed possible to compute

$$\begin{bmatrix} 2+2+10 & 3+-2+1+4 \\ 1+-2+-20 & 12+-1+-1-8 \end{bmatrix}$$

$$\begin{bmatrix} 14 & 6 \\ -21 & 2 \end{bmatrix}$$

e.

$$\begin{bmatrix} 0 & 3 \\ 1 & -1 \\ 2 & 1 \\ 5 & 2 \end{bmatrix} \begin{bmatrix} 1 & 2 & 1 & 2 \\ 4 & 1 & -1 & -4 \end{bmatrix}$$

note that the dimension are 4×2 and 2×4 so is indeed possible to compute

$$\begin{bmatrix} 12 & 3 & -3 & -12 \\ 1-4 & 2-1 & 1+1 & 2+4 \\ 2+4 & 4+1 & 2-1 & 4-4 \\ 5+8 & 10+2 & 5-2 & 10-8 \end{bmatrix}$$

$$\begin{bmatrix} 12 & 3 & -3 & -12 \\ -3 & 1 & 2 & 6 \\ 6 & 5 & 1 & 0 \\ 13 & 12 & 3 & 2 \end{bmatrix}$$