

Question 4

Saturday, October 14, 2023

6:19 PM

4. Consider the following matrices:

$$A = \begin{pmatrix} 1 & 2 \\ 2 & -1 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & 1 \end{pmatrix}, \quad F = \begin{pmatrix} 1 & 2 & 3 \end{pmatrix}$$

$$C = \begin{pmatrix} 1 & 2 \\ 3 & 1 \\ 2 & -1 \end{pmatrix}, \quad D = \begin{pmatrix} 1 & 0 & 3 \\ 1 & 1 & -2 \\ 2 & -1 & 1 \end{pmatrix}, \quad E = \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}$$

Compute the following expressions if defined: AB , BA , D^2 , B^2 , DC , CB , BC , FE , EF , CE , EC .

$$AB = \begin{pmatrix} 1 & 2 \\ 2 & -1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 5 & 2 & 5 \\ 0 & -1 & 5 \end{pmatrix}$$

$$BA = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 2 & -1 \end{pmatrix} = \text{und}$$

$$D^2 = \begin{pmatrix} 1 & 0 & 3 \\ 1 & 1 & -2 \\ 2 & -1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 3 \\ 1 & 1 & -2 \\ 2 & -1 & 1 \end{pmatrix} = \begin{pmatrix} 7 & -3 & 6 \\ -2 & 3 & -1 \\ 3 & -2 & 9 \end{pmatrix}$$

$$B^2 = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & 1 \end{pmatrix} = \text{und}$$

$$DC = \begin{pmatrix} 1 & 0 & 3 \\ 1 & 1 & -2 \\ 2 & -1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 3 & 1 \\ 2 & -1 \end{pmatrix} = \begin{pmatrix} 7 & -1 \\ 0 & 5 \\ 1 & 2 \end{pmatrix}$$

$$CB = \begin{pmatrix} 1 & 2 \\ 3 & 1 \\ 2 & -1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 5 & 2 & 5 \\ 5 & 1 & 10 \\ 0 & -1 & 5 \end{pmatrix}$$

$$BC = \begin{matrix} 1 & & 1 \\ 3 \times 2 & & 2 \times 3 \end{matrix} \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 3 & 1 \\ 2 & -1 \end{pmatrix} = \begin{pmatrix} 7 & -1 \\ 7 & 4 \end{pmatrix}$$

$$Fe = \begin{matrix} & & & 1 \\ & & & 2 \\ & & & -1 \\ 1 \times 3 & & 3 \times 1 \end{matrix} \begin{pmatrix} 1 & 2 & 3 \end{pmatrix} = 2$$

$$Ef = \begin{matrix} & & & 1 \\ & & & 2 \\ & & & -1 \\ 3 \times 1 & & 1 \times 3 \end{matrix} \begin{pmatrix} 1 & 2 & 3 \end{pmatrix} = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ -1 & -2 & -3 \end{pmatrix}$$

$$CE: \begin{matrix} & & & 1 \\ & & & 2 \\ & & & 3 \\ & & & 1 \\ 3 \times 2 & & 3 \times 1 \end{matrix} \begin{pmatrix} 1 & 2 \\ 3 & 1 \\ 2 & -1 \end{pmatrix} = \text{und}$$

$$EC \begin{matrix} & & & 1 \\ & & & 2 \\ & & & -1 \\ 3 \times 1 & & 3 \times 2 \end{matrix} \begin{pmatrix} 1 & 2 \\ 3 & 1 \\ 2 & -1 \end{pmatrix} = \text{und}$$