

1. In this problem, we will use the following matrices:

$$A = \begin{pmatrix} 2 & 5 \\ 3 & 7 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix}, \quad C = \begin{pmatrix} 2 & 0 & -1 \\ 5 & 1 & 1 \end{pmatrix}, \quad D = \begin{pmatrix} 4 & 3 \\ 1 & -1 \\ 0 & 2 \end{pmatrix}, \quad E = \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix}.$$

Find each of the following if they are defined:

- (a) $A + B$, (b) $3A - 2B$, (c) $B + C$, (d) A^T , (e) $C + D^T$, (f) $A + C$, (g) $C + D$,
(h) AB , (i) BA , (j) $B^2 = BB$, (k) $B^3 = BBB$, (l) AC , (m) BD , (n) CD ,
(o) DC , (p) CE , (q) DE , (r) $E^T D$.

2. In this problem, we will use the following matrices:

$$A = \begin{pmatrix} 2 & 5 \\ 3 & 7 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix}$$

Find (a) $\det A$, (b) $\det B$, (c) A^{-1} , (d) B^{-1} .

3. For each system of linear equations below, write it in the form $AX = B$.

Find, if possible, the matrix inverse A^{-1} and use this to solve the system by finding $X = A^{-1}B$:

(a)

$$\begin{aligned} x + 2y &= 4 \\ x + y &= 3 \end{aligned}$$

(b)

$$\begin{aligned} 2x + 3y &= 11 \\ 3x + 2y &= 9 \end{aligned}$$

(c)

$$\begin{aligned} 3x + 6y &= 11 \\ 4x + 8y &= 9 \end{aligned}$$