

Matrices Example Sheet I

Throughout this problem sheet, we define the following matrices:

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

$$B = \begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix}$$

$$C = \begin{pmatrix} 2 & 1 \\ 0 & 0 \\ 1 & -2 \end{pmatrix}$$

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. .
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$$D = \begin{pmatrix} 4 & 0 & 3 \\ \frac{1}{2} & -2 & 3 \end{pmatrix}$$

$$E = \begin{pmatrix} 1 & 1 & 0 \\ 1 & -1 & 0 \\ 2 & 1 & -2 \end{pmatrix}$$

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

1. In the cases where the sum is defined, calculate:

(i) $A + B$ (ii) $A + E$ (iii) $C + F$ (iv) $D + D$

2. In the cases where the product is defined, calculate:

(i) AB (ii) BA (iii) CD (iv) EF

3. Calculate the following:

(i) $4D$ (ii) $(A + E)B$ (iii) EB (iv) $AB + EB$
(v) AE (vi) $(AE)C$ (vii) EC (viii) $A(EC)$

Matrices Example Sheet II

- 1.** Let $A = \begin{pmatrix} 1 & -2 & -1 \\ 0 & 1 & 3 \\ 2 & -3 & 3 \end{pmatrix}$. Calculate $\det A$ (or $|A|$, if you prefer that notation).
- 2.** With A as in question **1**, calculate A^{-1} .
- 3.** Using your answer to question **2**, solve the following simultaneous equations:

$$\begin{aligned}x - 2y - z &= 2 \\ y + 3z &= 0 \\ 2x - 3y + 3z &= -4\end{aligned}$$