

Matrix 1 (Easy questions)

1. Write out the matrix $(c_{ij})_{3 \times 5}$ with $c_{ij} = \begin{cases} 2i - j & \text{if } i = 1 \text{ or } 2 \\ i + 3j & \text{otherwise} \end{cases}$.

2. Let $A = \begin{pmatrix} 1 & 2 & 3 \\ 0 & -4 & -1 \end{pmatrix}$. Find AA^t and A^tA .

3. Let $M = \begin{pmatrix} 0 & 2 & -3 \\ 0 & 0 & 4 \\ 0 & 0 & 0 \end{pmatrix}$. Find M^n for $n = 2, 3, 4, \dots$

4. Let $A = \begin{pmatrix} 2 & 3 \\ 1 & 0 \end{pmatrix}$. Find all matrices B such that $AB =$

(a) $\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$.

(b) $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$.

(c) $\begin{pmatrix} 1 & -1 \\ 1 & -1 \end{pmatrix}$.

5. For any $n \times n$ matrices A and B , we define a new operation as follows:

$$[A, B] = AB - BA.$$

Let C be another $n \times n$ matrix, find

(a) $[[A, B], C]$

(b) $[[A, B], C] + [[B, C], A] + [[C, A], B]$.