

### Lecture 3

1. Matrices are given  $A = \begin{pmatrix} 3 & -1 \\ 5 & 2 \end{pmatrix}$  a  $B = \begin{pmatrix} 1 & 0 \\ -4 & 3 \end{pmatrix}$ . Calculate:

a)  $2A + 3B$

b)  $A^T + 3B^T$

c)  $A \cdot B$

2. Matrices are given  $C = \begin{pmatrix} 1 & 4 & -2 \\ -1 & 1 & 3 \\ 0 & 2 & 2 \end{pmatrix}$  a  $D = \begin{pmatrix} 0 & 3 & -2 \\ -1 & 5 & -1 \\ 1 & 3 & 2 \end{pmatrix}$ . Calculate:

a)  $C \cdot D$

b)  $D \cdot C$

3. Compute the product of matrices  $F = \begin{pmatrix} 1 & -2 & 6 \\ 3 & -5 & 0 \end{pmatrix}$  a  $G = \begin{pmatrix} 4 & -1 & 6 \\ 9 & -5 & 7 \end{pmatrix}$ .

4. Determine the rank of the following matrices and decide which are regular (non-singular) and which are singular.

a)  $A = \begin{pmatrix} 2 & 5 \\ 1 & 1 \end{pmatrix}$

b)  $B = \begin{pmatrix} 5 & 5 \\ 1 & 1 \end{pmatrix}$

c)  $C = \begin{pmatrix} 1 & 7 & 5 \\ 2 & 4 & 0 \end{pmatrix}$

d)  $D = \begin{pmatrix} 1 & 2 & 4 \\ 0 & 3 & 1 \\ 1 & 5 & 5 \end{pmatrix}$

5. Calculate inversion matrices for following matrices:

a)  $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$

$$\text{b) } B = \begin{pmatrix} 1 & 0 \\ -4 & 3 \end{pmatrix}$$

$$\text{c) } C = \begin{pmatrix} 2 & 1 \\ 4 & 2 \end{pmatrix}$$

6. Solve the matrix equations, where  $A = \begin{pmatrix} 2 & 2 \\ -3 & 5 \end{pmatrix}$ ,  $B = \begin{pmatrix} 7 & 4 \\ -4 & 1 \end{pmatrix}$ ,  $C = \begin{pmatrix} 0 & 1 \\ 3 & 5 \end{pmatrix}$ .

$$\text{a) } 2A - X = B - C$$

$$\text{b) } AX = 3B$$

$$\text{c) } XA^T = 2C + XB^T$$