Birla Institute of Technology and Science, Pilani

Work Integrated Learning Programmes Division

Cluster Programme - M.Tech. in Data Science and Engg.

I Semester 2019-20

Mathematical Foundation for Data Science

Homework - 1

Q1 Let $A_{m\times n}$ be a given matrix with $m > n$. If the time taken to compute the determinant of a square matrix of size j is j^3, find upper bound on the

a) total time taken to find the rank of A using determinants

b) number of additions and multiplications required to determine the rank using the elimination procedure.

Q2 Let $A_{n\times n}$ be a given square matrix. Compute the number of multiplications and additions required to evaluate A^{28} using

a) the naive method, $A^{28} = \underbrace{A \cdot A \cdots A}_{28 \text{ times}}$

b) A^2, $A^4 = A^2 \cdot A^2$, etc.

Q3 Modelling of electrical / traffic networks would lead to a linear system $Ax = b$. Refer to the text book / other resources and construct a network which has the following properties

a) the number of equations are 6

b) A has rank 4

c) the system is consistent.