Q No 1

Sol:- We learnd how to solve linear optimization problem

i.e. $\underset{x \in \mathbb{R}^N}{\text{minimize}} \; \|y - Ax\|_2^2$

We looked at over and underdetermined systems for linear optimization.

We derived equation to solve Least square optimization problem analytically for overdetermined case i.e.

$$\hat{x} = (A^T A)^{-1} A^T y$$

Then we studied eigen decomposition ~~of square~~ and singular value decomposition which is technique used to decompose a matrix into several component matrices exposing many useful and interesting properties of original matrix.

Then we looked into the case in which noise has been added to a system

$$\hat{x}_{noisy} = \hat{x}_{noiseless} + A^{\dagger} e$$

In this we concluded the worst case ($\vec{e} = \vec{u}_R$) which effects the system the most.

I learned

- → Intuitive understanding of data processing using matrices and operations.
- → Assignment 1 helped me alot in solving some real world problems related to Least square optimization