CPSC 6300 Applied Data Science Homework 1

Please write down your name and CU number here:

Please submit Question 1 & 2 within one Jupyter Notebook file
Question 1: Please write a python function for Multiple Linear Regression $\beta = (A^T A)^{-1} A^T y$

Question 2: Please write a gradient descent based method to optimize the solution and compare the time consumption between these two methods with difference scales of input. [Note: the gradient descent based method can be found on the slides]

Question 3: Show that: $E(Y - \hat{Y})^2 = \underbrace{[f(X) - \hat{f}(X)]^2}_{Reducible} + \underbrace{Var(\epsilon)}_{Irreducible}$, if we denote $\hat{Y} = \hat{f}(X)$ while $Y = f(X) + \epsilon$, where ϵ is a random *error term*, which is independent of X and has mean *zero*.