HW01

A program that can do regularized linear model (polynomial basis) regression.

You have to do it with both LSE and Newton's method.

Input parameters:
    1. the file path and name of a file of which each row represents a data point (common seperated: x,y):
        1,12
        122,34
        -12,323
        ...
    2. the number of polynomial bases n

$$phi_0(x) = x^0, phi_1(x) = x^1, phi_2(x) = x^2, ..., phi_{n-1}(x) = x^{n-1}$$ ">.

    3. lambda

Behavior:

For example, if the number of bases is set as 3, it means that the program is going to find a curve that best fits the data by $ax^2 + bx^1 + cx^0 = y$ ">.

Required functions:
a. For LSE:
1. Use LU decomposition to find the inverse of (ATA + lambda*I), Gauss-Jordan elimination won't be accepted. A is the design matrix.
2. Print out the equation of the best fitting line and the error.
b. For Newton's method:
1. Print out the equation of the best fitting line and the error, and compare to LSE.

NOTE:

* Use whatever programming language you prefer.
* You should use as few functions from any library as possible. That would be great if you implement all detail operations (like matrix operations) by yourself.
* Time complexity is not what we care for now, but if you like to improve it in that regard, it is always good for you.