AM 147: Computational Methods and Applications: Winter 2023

Homework #6

Instructor: Abhishek Halder

Due: February 22, 2023

NOTE: Please submit your Homework as a single zip file named `YourlastnameYourfirstnameHW6.zip` via CANVAS. For example, `HalderAbhishekHW6.zip`. Please strictly follow the capital and small letters in the filename of the zip file you submit. You may not receive full credit if you do not follow the file-naming conventions. Your zip file should contain all .m files (MATLAB scripts) for the questions below.

Your zip file must be uploaded to CANVAS by 11:59 PM Pacific Time on the due date. The uploads in CANVAS are time-stamped, so please don't wait till last moment. Late homework will not be accepted.

Problem 1

Linear spline interpolation (50 points)

Please review Lec. 16, p. 4-8 before you start this exercise.

We want to compute and plot linear spline interpolation for the dataset $x = -1 : 0.1 : 1$, and $y = \dfrac{1}{1+25x^2}$.

For this purpose, rename the starter code `W23HW6.m` inside CANVAS File Section folder HW Problems and Solutions, to `YourlastnameYourfirstnameHW6.m` and then complete the lines 20, 23, 24, 25 and 28. Apart from changing the right hand sides of the equality signs in these lines, you should not add or modify any other lines of code.

The for loop encompassing `X{i}` in line 20 is creating a cell array (an array of matrices) in MATLAB, that is, `X{i}` is the ith diagonal block of the coefficient matrix for the linear spline.

To complete line 23, please look up and use the command `blkdiag` from MATLAB documentation. To complete line 24, look up and use the command `repelem` from MATLAB documentation. Line 25 should use backslash from keyboard to solve the appropriate linear system. To complete lines 20, 23, 24, 25, 28, you should not use any special inbuilt commands other than `blkdiag`, `repelem` and backslash.