Oblig1 MAT4110

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September 2019

Introduction

The aim of this project is to compare the implementation and results of two different approaches of solving the least squares problem, for a given set of linear equations, namely QR factorization and Cholesky factorization. The implementation of both methods are available at my github repository final.m.
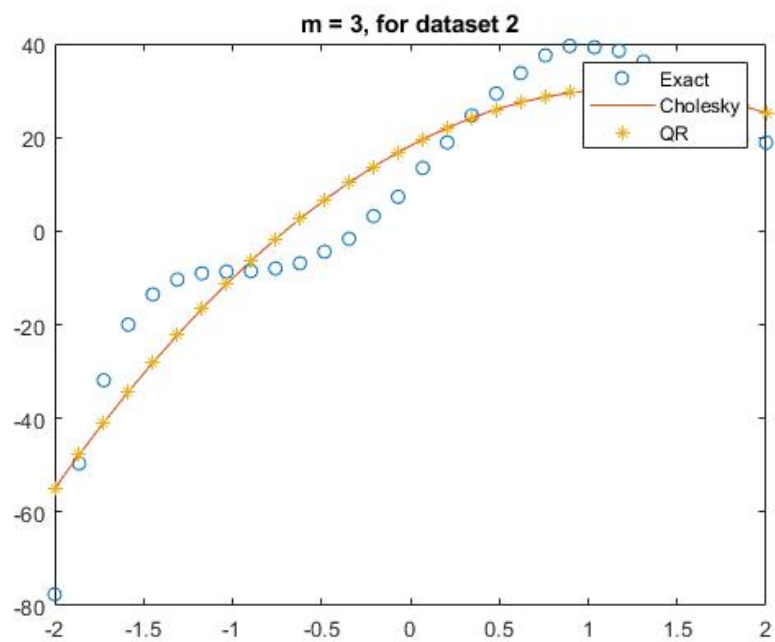
Results

Since both methods are well discussed in the assignment text, I've just attached the results of running the code for the two given values of m.

The matlab code is attached, changing the value of m to 3, resulted in the same figure as mentioned in the assignment's text:
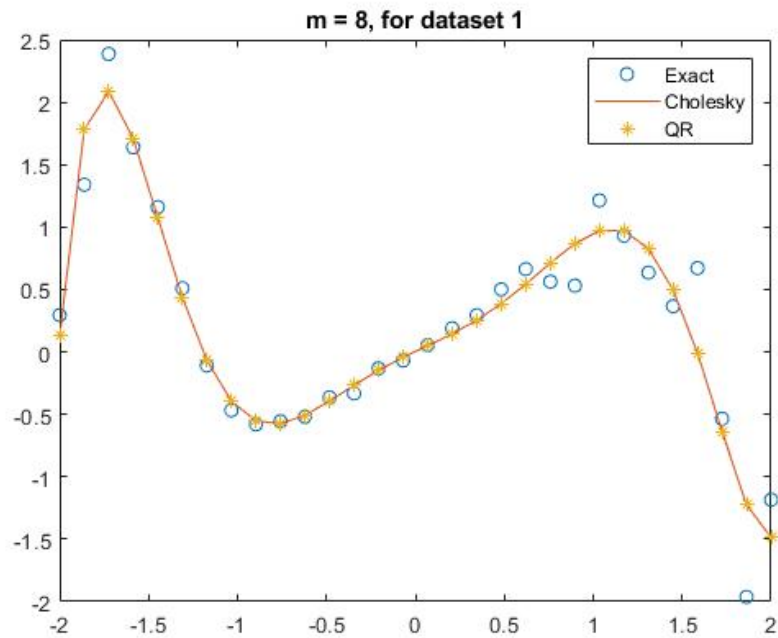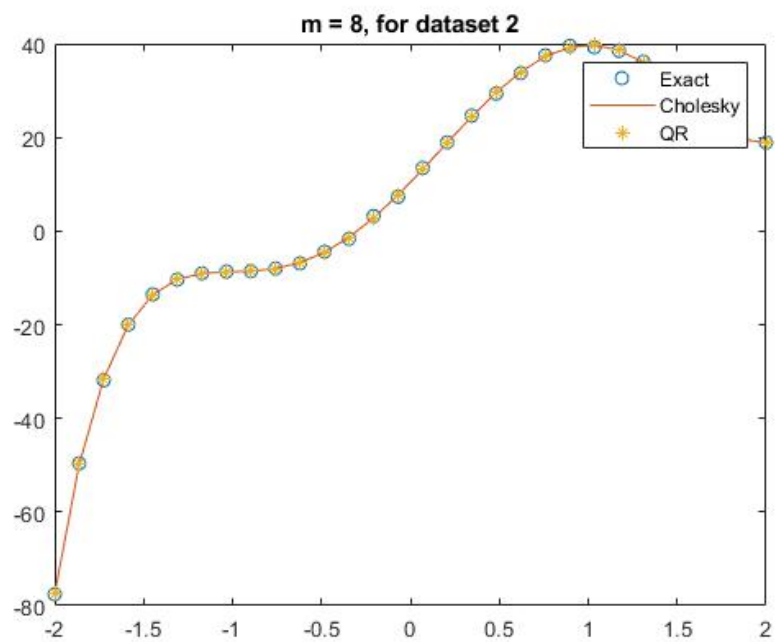
m = 3

m = 3, for dataset 1

For the second dataset:

m = 3, for dataset 2

m = 8
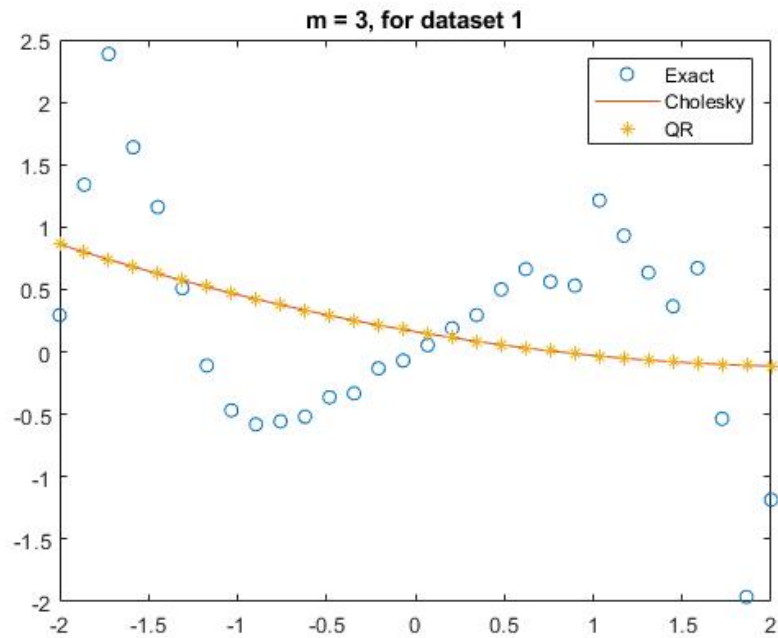
m = 8, for dataset 1

For the second dataset:

m = 8, for dataset 2

Condition number

To find the condition number for each approach for every data set, I have used the SVD(singular value decomposition) function in matlab. Using the method given in the lectures:

$$K(A) = \frac{\sigma_{max}(A)}{\sigma_{min}(A)}$$

Matlab has a built-in function $cond(A)$ that I used to check my condition results against.

m	QR- cond(A)	Cholesky-cond(B)
m = 3	3.3567	11.2674
m = 8	508.8654	2.5894e+05

Showing that the condition number for Cholesky algorithm is more sensitive than of QR-factorization.