README

The lab4 folder contains 9 files/folders:
1)lab4.m: which is the main matlab code of lab 4, in which the code for question 1-4 was implied.
2)q2function.m: which is a matlab function for question 2, in which the Cholesky decomposition and QR approximation methods were compared in efficiency and accuracy.
3)q3function.m: which is a matlab function for question 3, a function between the order of approximation and the linear least squared error.
4)q4function.m: which is a matlab function for question 4, a function between the number of bins in approximation and the linear least squared error.
5)xy.dat: the original data.
6)bspline: which is the folder contain the B-spline package.
7)result: which contain the result of this lab.
8)lab4report.pdf: which is the lab report
9) README.pdf: which is the documentation of the lab 4

To run the code:
1) be sure the bspline package, lab4.m, q2function.m, q3function.m, q4function.m and xy.dat are in your workspace.
2)using matlab to open lab4.m
3)**add the bspline package to the path of matlab**(using the Set Path)
4)click the ‘run’ button of matlab to run the code.

Output:

Question1 :
Question2 :

conditionNumber =

    3.1662

Elapsed time = 0.015910
Least squared error is 5.171333
Elapsed time = 0.017252
Least squared error is 5.171333

When nbin= 10
Cholesky decomposition least squared error is 5.171333
time spent: 0.004082
QR algorithm least squared error is 5.171333
time spent: 0.007307
When nbin= 20
Cholesky decomposition least squared error is 4.901212
time spent: 0.000293
QR algorithm least squared error is 4.901212
time spent: 0.013805

When nbin= 30
Cholesky decomposition least squared error is 4.773524
time spent: 0.000322
QR algorithm least squared error is 4.773524
time spent: 0.016789
When nbin= 40
Cholesky decomposition least squared error is 4.611320
time spent: 0.000462
QR algorithm least squared error is 4.611320
time spent: 0.016973
When nbin= 50
Cholesky decomposition least squared error is 4.525486
time spent: 0.000481
QR algorithm least squared error is 4.525486
time spent: 0.008599

Question3 :
When p= 0, least squared error is 12.200571
When p= 1, least squared error is 6.391435
When p= 2, least squared error is 5.171333
When p= 3, least squared error is 5.004788
When p= 4, least squared error is 4.985118
When p= 5, least squared error is 4.931477

Question4 :
When nbin= 10, least squared error is 5.171333
When nbin= 20, least squared error is 4.901212
When nbin= 30, least squared error is 4.773524
When nbin= 40, least squared error is 4.611320
When nbin= 50, least squared error is 4.525486
When nbin= 60, least squared error is 4.474111
When nbin= 70, least squared error is 4.233525
When nbin= 80, least squared error is 4.214192
When nbin= 90, least squared error is 4.104641
When nbin= 100, least squared error is 3.953271

Figure1:

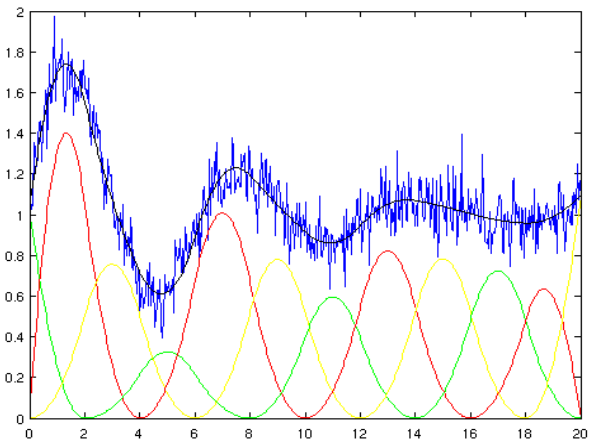


Figure2:

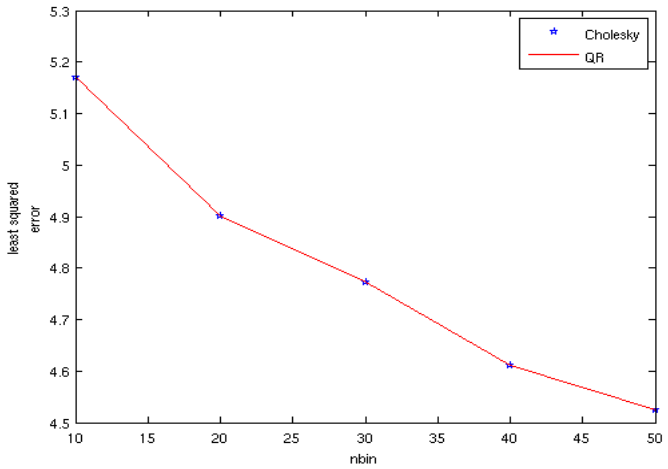


Figure3:

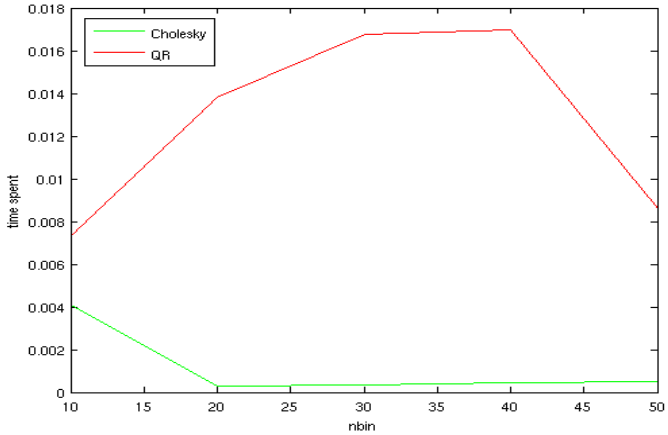


Figure4:

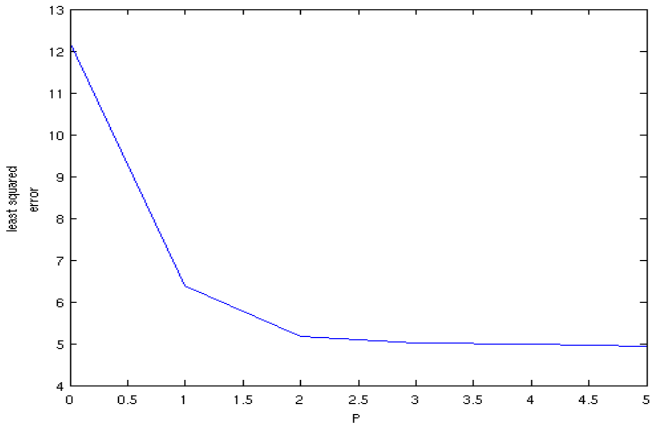
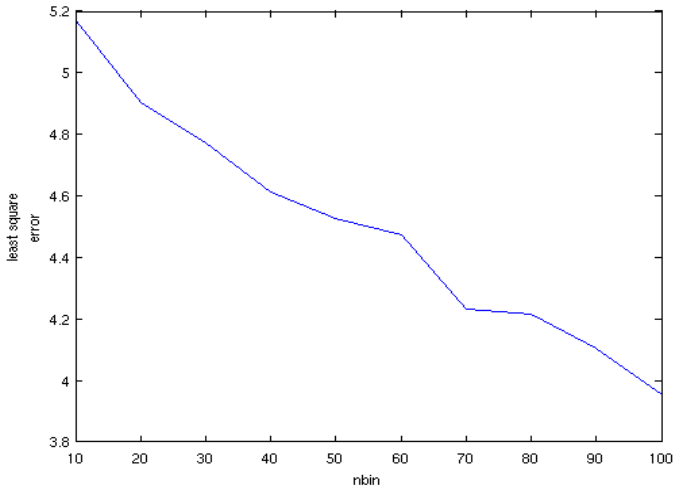


Figure 5:


5.2
5
4.8
4.6
4.4
4.2
4
3.8
least square error
10
20
30
40
50
60
70
80
90
100
nbin