AMSC/CMSC460 Section 2. Update: W April 27, 2011

Homework Set 5. No.2 Due: Th April 28, 2011. 10:45am
By the end of the class

Analytical Problems

1. [No need to do this problem]

Find a function form of y=exp(Cx) that best fits the data set consisting of 2 data

a. $(x_1,y_1)=(0,1/2)$ & $(x_2,y_2)=(0,1)$

b. $(x_1,y_1)=(0,A)$ & $(x_2,y_2)=(0,B)$

c. Verify consistency of your results from (a) and (b)

2. Determine the best approximate solution of the linear system

$$\begin{cases} 2x+3y=1 \\ x-4y=-9 \\ 2x-y=-1 \end{cases}$$

in the least-square sense.

Computational Problem

3. Generate a data set {t(l), b(l)} by

    b(l)=a0+a1*t(l)+a2*t(l)^2+a3*sin(t(l))

for l=1,..,L=100, where

    (a0, a1, a2, a3)=(2, 3, 0.1, -0.1);

    t=linspace(0,2,L)';

4a. Develop a general MATLAB code for the least-square estimation using the QR factorization ~~with partial scaled pivoting~~, following the steps in Exercise 3.

b. Using the code, compute the coefficient c0 and c1 of the linear function

    q(t)=c0+c1*t

   that fits your data generated by Problem 3 in the least square sense.

c. Plot in one figure

   - all data points
   - linear line that you obtained by the QR decomposition.

5a. Develop a general MATLAB code for the least-square estimation using Cholesky factorization following the steps in Exercise 4.

b. Using the code, compute the coefficient c0 and c1 of the linear function

    q(t)=c0+c1*t+c2*t^2

   that fits your data generated by Problem 3 in the least square sense.

c. Plot in one figure

   - all data points
   - ~~linear line~~ quadratic line that you obtained by the Cholesky factorization.