

CSCI-GA.2420-001/MATH-GA.2010-001
Numerical Methods I Fall 2013
September 30, 2013

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Homework set 3: Due October 11 at 12 noon.

Homework should be given to me in class or put under my office door.
Do not put it in my mail box.

In all cases, discuss your findings.

1. Problems 7.4 of the T&B book.
2. Formulate and solve the least squares problem of one of Gauss' 1850 lectures. Use MATLAB and the simplest possible script. Also compute the maximum error of the solution.

The data is as follows:

$$Q = P + 64.334$$

$$R = P + 349.366$$

$$R = Q + 283.596$$

$$S = Q + 206.580$$

$$S = R - 76.108$$

$$T = R + 648.427$$

$$T = S + 719.612$$

$S, T, Q, R,$ and P represent the elevation of five towns in Northern Germany. The solution should represent the difference in elevations of the towns.

3. Problem 11.3 in T&B's book.
4. Consider $n > 3$ points $(x_i, y_i, z_i), 1 \leq i \leq n$, in three-dimensional, real Euclidean space. The points lie close to a common plane. Determine a plane which goes through $(\bar{x}, \bar{y}, \bar{z})$ where $\bar{x} = \sum_{i=1}^n x_i/n$, etc., which provides the best least squares fit to the data. Also show how the normal to the plane can be obtained readily by using the singular value decomposition.
5. Problem 13.3 in the T&B book.