**Department of Aerospace Engineering**

**AE602 Mathematics for Aerospace Engineers**

**Assignment No. 6**

**6.1** Find the best least squares solution to . What error is minimized? Check that the error vector is perpendicular to the column

**6.2** Suppose the values and at times and are fitted by a line through the origin. Solve and by least squares, and sketch the best line.

**6.3** Solve by least squares and find if

Verify that the error is perpendicular to the columns of .

**6.4** Write out and set to zero its derivatives with respect to , if

Compare the resulting equations with confirming that calculus as well as geometry gives the normal equations. Find the solutions and the projection Why is

**6.5** The following system has no solution:

Sketch and solve a straight line fit that leads to the minimization of the quadratic What is the projection of onto the column space of ?

**6.6** Find the projection of onto the column space of

Split into, with in the column space and perpendicular to that space. Which of the four subspaces contains?

**6.7** Find the projection matrix onto the space spanned by and

**6.8** Find the best straight line fit (least squares) to the measurements

Then find the projection of onto the column space of

A=.

**6.9** We want to fit a plane to the four points

1. Find 4 equations in 3 unknowns to pass a plane through the points (if there is such a plane).
2. Find 3 equations in 3 unknowns for the best least squares solution.