**Department of Aerospace Engineering**

**AE602 Mathematics for Aerospace Engineers**

**Assignment No. 7**

**7.1** (a) Write down the four equations for fitting to the data

Show that the columns are orthogonal.

(b) Find the optimal straight line, draw a graph, and write down the error .

(c) Interpret the fact that the error is zero in terms of the original system of four equations in two unknowns: Where is the right side with relation to the column space, and what is its projection

**7.2** If and are orthogonal matrices, and therefore satisfy , show that is also orthogonal. If is rotation through θ, and is rotation through ф, what is Can you find the trigonometric identities for and in the matrix multiplication

**7.3** If is a unit vector, show that is an orthogonal matrix. (It is a reflection, also known as a Householder transformation.) Compute when .

**7.4** Find a third column so that the matrix

**7.5** Apply the Gram-Schmidt process to

and write the result in the form

**7.6** Suppose the given vectors are

Find the orthonormal vectors .

**7.7** Find an orthonormal set for which span the column space of

Which fundamental subspace contains What is the least squares solutions solution of if

**7.8** Express the Gram-Schmidt orthogonalization of

as Given vectors each with components, what are the shapes of