Homework assignment, April 5, 2004.

Due Wednesday, 4/7 (collected)
I'll be also collecting problems 1 and 7 from the previous set (assigned 3/26)

1. Find least square solution of the system

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 1 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$$

2. Find the matrix of the orthogonal projection P onto the column space of

$$\begin{pmatrix} 1 & 1 \\ 2 & -1 \\ -2 & 4 \end{pmatrix}.$$

3. Find the best straight line fit (least square solution) to the points $(-2, 4)$, $(-1, 3)$, $(0, 1)$, $(2, 0)$.

4. Fit a plane $z = a + bx + cy$ to four points $(1, 1, 3)$, $(0, 3, 6)$, $(2, 1, 5)$, $(0, 0, 0)$.
   To do that

   a) Find 4 equations with 3 unknowns a, b, c such that the plane pass through all 4 points (This system does not have to have a solution)

   b) Find the least square solution of the system

5. Suppose P is the orthogonal projection onto a subspace E, and Q is the orthogonal projection onto the orthogonal complement $E^{\perp}$.

   a) Wnat are $P + Q$ and PQ?

   b) Show that $P - Q$ is its own inverse.