.

1. (JPE, September 1997) Let

$$A = \begin{pmatrix} 3 & 3\\ 0 & 4\\ 4 & -1 \end{pmatrix}, \quad \text{and} \quad b = \begin{pmatrix} 2\\ -2\\ 1 \end{pmatrix}$$

Use the Gram-Schmidt process to find an orthonormal basis for the column space of A. Factor A into a product QR where  $Q \in \mathbb{R}^{3\times 2}$  has an orthonormal set of column vectors and  $R \in \mathbb{R}^{2\times 2}$  is upper triangular. Solve the least squares problem Ax = b. Compute the norm of the residual vector, ||r||.

2. (JPE, May 1998). Given the data (0,1), (3,4) and (6,5), use a QR factorization technique to find the best least squares fit by a linear function. Also, solve the problem via the system of normal equations.

3. Problem 7.5 from the textbook.