Instructions: Write complete legible solutions to the following problems in the space provided. Be sure to supply all the necessary steps that lead to your answers.

1. Consider the system

$$\begin{cases} x+y=7 \\ -x+y=0 \\ -x+2y=-7 \end{cases}$$

a. Find the associated normal system.
b. Find the least squares solution.
c. Find the error vector and the least squares error.

2. Consider the set of points.

X	–2	1	2	3	3
Y	–3	2	3	4	6

a. Convert the table into a matrix equation of the form

$$\begin{bmatrix} x_1 & 1 \\ x_2 & 1 \\ \cdot & \cdot \\ \cdot & \cdot \end{bmatrix} \begin{bmatrix} M \\ B \end{bmatrix} = \begin{bmatrix} y_1 \\ y_2 \\ \cdot \\ \cdot \end{bmatrix}$$

b. Use a projection matrix with a linear independent basis for the column space of the above matrix to find the least squares solution to the associated system of equations.

c. Repeat using a matrix with an orthonormal basis for the column space to find the least squares solution.