

1. Find the least square solution for  $Ax = b$  if

$$A = \begin{bmatrix} 1 & 3 \\ 1 & -1 \\ 1 & 1 \end{bmatrix} \text{ and } b = \begin{bmatrix} 5 \\ 1 \\ 0 \end{bmatrix}.$$

2. Find the orthogonal projection of  $b$  onto  $\text{Col}(A)$  and the least square solution of the equation

$$Ax = b \text{ if } A = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & -1 \\ 0 & 1 & 1 \\ -1 & 1 & -1 \end{bmatrix} \text{ and } b = \begin{bmatrix} 2 \\ 5 \\ 6 \\ 6 \end{bmatrix}.$$

3. Find the least square solution of  $Ax = b$  if

$$A = \begin{bmatrix} 1 & -1 \\ 1 & 4 \\ 1 & -1 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 1/2 & -1/2 \\ 1/2 & 1/2 \\ 1/2 & -1/2 \\ 1/2 & 1/2 \end{bmatrix} \begin{bmatrix} 2 & 3 \\ 0 & 5 \end{bmatrix} \text{ and } b = \begin{bmatrix} -1 \\ 6 \\ 5 \\ 7 \end{bmatrix}.$$

4. Find an orthogonal basis for  $\text{Col}(A)^\perp$  for the matrix  $A$  in Problem 3.

5. Find the equation  $y = a_0 + a_1x$  of the least square line that best fits the data:  $(2, 3), (3, 2), (5, 1), (6, 0)$ .