

1) Solve (write solution in vector form)

$$x_1 + x_2 - x_3 + x_4 = 0$$

$$2x_1 + 2x_2 + x_3 + x_4 = 1$$

$$x_3 + 2x_4 = -1$$

2) Find the inverse of $\begin{bmatrix} 1 & 1 & 1 \\ 2 & 3 & 2 \\ 3 & 8 & 2 \end{bmatrix}$

3) Find a basis of the image and a basis of the kernel of $\begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 3 \\ 0 & 1 & 2 \end{bmatrix}$.

What are the dimensions of these two subspaces?

4) Apply Gram-Schmidt to $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 2 \\ 1 \end{bmatrix}$

5) Find the least square solutions of

$$\begin{bmatrix} 1 & 1 \\ 1 & 2 \\ 1 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 6 \end{bmatrix}$$

6) Find the eigenvalues & eigenvectors

of $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$, $\begin{bmatrix} 1 & 2 \\ -2 & 1 \end{bmatrix}$