Exercise for TA Session

Dec. 20, 2016

I Find the orthogonal projection of $\vec{q} = \begin{pmatrix} 1 \\ -2 \\ 3 \\ -4 \end{pmatrix}$ in the direction of $\vec{p} = \begin{pmatrix} 1 \\ 2 \\ -1 \\ 2 \end{pmatrix}$

II Find an orthonormal basis for V spaned by $\vec{p}$ and $\vec{q}$. and the orthogonal projection of $\vec{c}$ along V.

(1) $\vec{p} = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}$, $\vec{q} = \begin{pmatrix} 1 \\ 1 \\ 2 \\ 4 \end{pmatrix}$, $\vec{c} = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}$

(2) $\vec{p} = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}$, $\vec{q} = \begin{pmatrix} 1 \\ 2 \\ 3 \\ 2 \end{pmatrix}$, $\vec{c} = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}$

III Orthogonalize A.

(1) $A = \begin{pmatrix} 2 & 2 \\ 2 & 5 \end{pmatrix}$ (2) $A = \begin{pmatrix} -1 & 3 \\ 3 & 7 \end{pmatrix}$

(3) $A = \begin{pmatrix} 1 & 4 \\ 4 & 7 \end{pmatrix}$ (4) $A = \begin{pmatrix} 1 & 2 \\ 3 & -4 \end{pmatrix}$

(5) $A = \begin{pmatrix} -4 & -2 \\ 3 & 1 \end{pmatrix}$

let

IV $R_1 = \begin{pmatrix} \cos\theta_1 & -\sin\theta_1 \\ \sin\theta_1 & \cos\theta_1 \end{pmatrix}$, $R_2 = \begin{pmatrix} \cos\theta_2 & -\sin\theta_2 \\ \sin\theta_2 & \cos\theta_2 \end{pmatrix}$.

Find R_1R_2 and R_1^{-1}.