Assignment#6

Chapter 6

1. Let $\mathbf{p} = x$ and $\mathbf{q} = x^2$ and the stated sample points are given :
$$x_0 = -2, x_1 = 0, x_2 = 2$$
   (a)Find $\| \mathbf{p} \|$ relative to the evaluation inner product on P_2

   (b)Show that the vectors $\mathbf{p}$ and $\mathbf{q}$ are orthogonal with respect to this inner product.

2. Find a basis for the orthogonal complement of the subspace of R^n spanned by the vectors.
$$\mathbf{v_1} = (1, 4, 5, 2), \mathbf{v_2} = (2, 1, 3, 0), \mathbf{v_3} = (-1, 3, 2, 2)$$

3. The vectors $\mathbf{v_1}$, $\mathbf{v_2}$, and $\mathbf{v_3}$ are **orthonormal** with respect to the Euclidean inner product on R^4 . Find the orthogonal projection of $\mathbf{b} = (1, 2, 0, -1)$ onto the subspace W spanned by these vectors.
$$\mathbf{v_1} = (\tfrac{1}{2} , \tfrac{1}{2} , \tfrac{1}{2}, \tfrac{1}{2}), \mathbf{v_2} = (\tfrac{1}{2} , \tfrac{1}{2} , -\tfrac{1}{2} , -\tfrac{1}{2}), \mathbf{v_3} = (\tfrac{1}{2} , -\tfrac{1}{2} , \tfrac{1}{2} , -\tfrac{1}{2})$$

4. Find a least square solution of $Ax=b$ by QR-decomposition of the matrix A

$$A = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 1 & -2 \\ 1 & 1 & 0 \\ 1 & 1 & -1 \end{bmatrix} \quad , \quad b = \begin{bmatrix} 6 \\ 0 \\ 9 \\ 3 \end{bmatrix}$$

5. Let W be the plane with equation $5x - 3y + z = 0$.

   a. Find a basis for W.   (5 points)

   b. Find the standard matrix for the orthogonal projection onto W.(5 points)

6. find parametric equations for all least squares solutions of $Ax = b$,

$$A = \begin{bmatrix} -1 & 3 & 2 \\ 2 & 1 & 3 \\ 0 & 1 & 1 \end{bmatrix}, \quad b = \begin{bmatrix} 7 \\ 0 \\ -7 \end{bmatrix}$$

7. Find the least squares straight line fit
$$y = ax + b$$
   to the data points:
$$(0, 1), (2, 0), (3, 1), (3, 2)$$
   and show that the result is reasonable by graphing the fitted line and

plotting the data in the same coordinate system.

評分標準：

截止日期： 12/7 00:00(週三)