Assignment#6

Chapter 6

1. (5 points)Let**p** *= x* and **q** *= x2* and the stated sample points are given :

*x0 =* −2*, x1 =* 0*, x2 =* 2

(a)Find‖**p**‖relative to the evaluation inner product on**𝑃2.**(2.5 points)

(b)Show that the vectors **p** and **q** are orthogonal with respect to this inner product.(2.5 points)

1. (5 points)Find a basis for the orthogonal complement of the subspace of **𝑅n** spanned by the vectors.

**v1**= (1, 4, 5, 2), **v2** = (2, 1, 3, 0), **v3** = (−1, 3, 2, 2)

1. (5 points)The vectors **v1** , **v2**, and **v3** are **orthonormal** with respect to the Euclidean inner product on **𝑅4** . Find the orthogonal projection of **b** = (1, 2, 0, −1) onto the subspace **𝑊** spanned by these vectors.

**v1** = ( , , , ), **v2** = ( , , − , − ), **v3** = ( , − , , − )

1. (15 points)Consider

A=

1. Find an orthonormal basis for the column space of **A** .(5 points)
2. Write A as **QR**-decomposition , where **Q** has **orthonormal** columns and **R** is upper triangular.(5 points)
3. Find the least square solution to **A*x*=b ,**if **b** =[-3 , 7 , 1 , 0 , 4]T .(5 points)
4. (10 points)Let **𝑊** be the plane with equation 5*x* − 3*y* + *z* = 0.

a. Find a basis for **𝑊**. （5 points）

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

1. (20 points)Consider

A=

1. Find the projection matrix **P** onto the row space of **A** , and the projection matrix **Q** onto the nullspace of **A**. (10 points)
2. Find **P+Q. Explain your result.** (5 points)
3. Find **PQ**. Explain your result.(5 points)
4. (10 points)Find parametric equations for all least squares solutions of

**A*x* = b** ,

Where column vectors of **A** are **not** linear independent.

**A** *,* **b***=*

1. (10 points)Find the least squares straight line fit

***y*** *= a****x*** *+ 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.

9. (20 points)Given the following set of data points :

(-5, -133), (-4, -71), (0, -3), (3, 27)

(a)Find the parabola y=ax2+bx +c which best fits these points.(10 points)

(b)Find the parabola y=ax2+c with no linear term which best fits these points. (10 points)

**評分標準：**

每題配分已標注，答錯即0分。

本次作業無需每題寫心得，請選擇你認為需要的，不單獨算分，但完全不寫心得最多-20.

**！！**如果不會請去請教同學，並在作業裡說明你請教了誰。如未說明且被發現答案相似度過高（包括過程，心得，結果），則按抄襲處理！

**截止日期：12/8 00:00(週四)**