Linear Algebra. Homework Set # 14 Due 4/30/08 Name:______________

1. #10 §6.4, p. 408 : Find an orthogonal basis for the colmuns of the matrix $A = \begin{pmatrix} -1 & 6 & 6 \\ 3 & -8 & 3 \\ 1 & -2 & 6 \\ 1 & -4 & -3 \end{pmatrix}$.

2. #14, §6.4, p. 408 : The columns of Q were obtained by teh Gram-Schmidt process of the columns of A. Find an upper triangular matrix R such that $A = QR$, given $A = \begin{pmatrix} -2 & 3 \\ 5 & 7 \\ 2 & -2 \\ 4 & 6 \end{pmatrix}$ and $Q = \begin{pmatrix} -2/7 & 5/7 \\ 5/7 & 2/7 \\ 2/7 & -4/7 \\ 4/7 & 2/7 \end{pmatrix}$.

3. #6, §6.5, p. 416 : Find the leaast-sqares solution to $A\mathbf{x} = \mathbf{b}$, given $A = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 1 & 0 & 1 \\ 1 & 0 & 1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 7 \\ 2 \\ 3 \\ 6 \\ 5 \\ 4 \end{pmatrix}$.

4. #16, §6.5, p.417 : Use the factorization $A = QR$ to find the least-squares solution of $A\mathbf{x} = \mathbf{b}$, given $A = \begin{pmatrix} 1 & -1 \\ 1 & 4 \\ 1 & -1 \\ 1 & 4 \end{pmatrix} = \begin{pmatrix} 1/2 & -1/2 \\ 1/2 & 1/2 \\ 1/2 & -1/2 \\ 1/2 & 1/2 \end{pmatrix} \begin{pmatrix} 2 & 3 \\ 0 & 5 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} -1 \\ 6 \\ 5 \\ 7 \end{pmatrix}$.

5. #10 , §6.7, p. 435: Let $\mathbf{P}_3$ have the inner product given by evaluation at -3, -1, 1, and 3. Let $\mathbf{P}_0 = 1$, $\mathbf{p}_1(t) = t$, and $\mathbf{p}(t) = t^2$. First find a polynomial $\mathbf{q}$ that is orthogonal to $\mathbf{p}_0$ and $\mathbf{p}_1$. The find the best approximation to $\mathbf{p}(t) = t^2$ by the polynomials in Span$\{\mathbf{p}_0, \mathbf{p}_1, \mathbf{q}\}$