MATH 401 Dr. Wolfe ASSIGNMENT #1 Due September 24, 2007

1. Probs.39 & 41, p.49, **Lay**.
2. Probs. 41 & 43, p.72, **Lay**.
3. Prob.30, p.81, **Lay**.
4. Prob.22, p.117, **Lay**.
5. Prob.11, p.184, **Lay**.
6. Recall that a square matrix A is symmetric if $A = A^T$. Prove that if A is $m \times n$, AA^T and A^TA are always symmetric. Show by example that they may not be equal, even for square matrices.
7. Find the orthogonal complement of the plane spanned by the vectors $(1, 1, 3)$ and $(1, 2, 5)$ by taking these to be the rows of A and solving $A\mathbf{x} = \mathbf{0}$. Remember that the compliment is a whole line
8. Prove by induction on n: For $n \geq 2$, the inverse of an $n \times n$ invertible lower-triangular matrix is a lower- triangular matrix. Hint: Work with matrices partitioned as

$$A_{n+1} = \begin{bmatrix} A_n & \mathbf{0} \\ \mathbf{b}^T & a \end{bmatrix}$$

where $\mathbf{b} \in \mathbf{R}^n$.