MAS 3105 PM April 3, 2008
Quiz 6 Prof. S. Hudson

1) True-False (temporarily missing)

2) Find the least squares solution to the system (see Example 1, page 238).

3) Choose ONE of these.

a) State and prove the Fundamental Subspace Theorem (5.2.1).

b) Prove that Manhattan distance ($||x||_1$) defines a *norm* on R^2.

c) State and prove the normal equations.

Remarks and Answers: The average grade was about 44/60. The scale is A's 52-60, B's 46-51, C's 40-45, D's 35-39.

I averaged your best 5 out of 6 quiz grades in the upper right corner (as on Quiz 5) and wrote your approximate semester grade there. The average for that is about 49 out of 60. The unofficial semester scale is: A's 54-60, B's 49-53, C's 43-48, D's 38-42.

1) TTTFT

2) I gave at least 10 points if you knew the normal equations and substituted into them successfully. Solving the system involves some fractions; the simplest method is probably to compute the inverse of A^TA using the adjoint method. $A^TA\hat{x} = A^Tb$ becomes

$$\begin{pmatrix} 9 & -7 \\ -7 & 11 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix} \quad \text{So,} \quad \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \frac{1}{50} \begin{pmatrix} 11 & 7 \\ 7 & 9 \end{pmatrix} \begin{pmatrix} 5 \\ 4 \end{pmatrix} = \begin{pmatrix} 83/50 \\ 71/50 \end{pmatrix}$$

3) Most people chose a); see the text. In a), you should explain why $R(A^T) \perp N(A)$ (see the paragraph above Theorem 5.2.1). I can see how you might think this wasn't part of the proof, so I only took off about 2 points for that. You are always welcome to ask me about such things before or during the quiz.