MAS 3105 May 11, 2006
Quiz I and Key Prof. S. Hudson

1) Decide whether the vector $\mathbf{b}$ can be written as a linear combination of the vectors $\mathbf{v_1}$ and $\mathbf{v_2}$ and briefly justify your answer.

$$\mathbf{b} = \begin{pmatrix} 1 \\ 5 \end{pmatrix}, \quad \mathbf{v_1} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \quad \mathbf{v_2} = \begin{pmatrix} 5 \\ 5 \end{pmatrix}$$

2) Use Gaussian elimination to put the following system into reduced row echelon form. Use matrix notation. You don't have to find the solution set.

$$\begin{aligned} x_1 + x_2 + x_3 &= 1 \\ 2x_1 + 2x_2 + x_3 &= 4 \end{aligned}$$

3) Answer each part with "True" or "False".

a) A 3x3 matrix in RREF must have at least three zeros .

b) If a system can be reduced to triangular form then it has a unique solution.

c) Multiplying a row by zero is an example of an elementary operation.

d) Every consistent underdetermined system has at least one free variable.

e) If the matrices A, B and C are all 3x3, then $A(B + C) = (B + C)A$

Remarks and Answers: The average was 50/60, which is quite good even for the first quiz. The other quizzes will probably be more like the HW than this one was, but the material gets a bit harder, and the average score usually slides down (but so does the scale). For this quiz, the approx scale is : A's = 54-60, B's = 48-53, C's = 42-47, and D's = 36-41.

1) It cannot. Any L.C. must be of the form $\mathbf{b} = \alpha\mathbf{v_1} + \beta\mathbf{v_2}$ so it must have $b_1 = b_2$, which is not true for the $\mathbf{b}$ that is given.

Another explanation - Some people rephrased the equation as a linear system and showed it was inconsistent (Full credit). But if your justification did not seem clear or logical, it didn't get much credit.

2) The top row of the answer is [1 1 0 3] and the bottom one is [0 0 1 -2].

3) T T F T F (already discussed in class)