Math 214 Spring 2007

BONUS QUIZ 2

Linear Systems

Name: _____

Date: _____

Friday February 9
Ron Buckmire

Topic : Homogeneous and Non-Homogeneous Linear Systems.

The idea behind this quiz is for you to get practice solving systems using gaussian elimination as well as with analytic geometry and interpreting your answers.

Reality Check:

EXPECTED SCORE : _____/10 ACTUAL SCORE : _____/10

Instructions:

0. Please look for a hint on this quiz posted to `faculty.oxy.edu/ron/math/214/07/`
1. Once you open the quiz, you have **30 minutes** to complete, please record your start time and end time at the top of this sheet.
2. You may use the book or any of your class notes. You must work alone.
3. If you use your own paper, please staple it to the quiz before coming to class. If you don't have a stapler, buy one.
4. After completing the quiz, sign the pledge below stating on your honor that you have adhered to these rules.
5. Your solutions must have enough details such that an impartial observer can read your work and determine HOW you came up with your solution.
6. Relax and enjoy...
7. **This quiz is due on Monday February 12**, in class. NO LATE QUIZZES WILL BE ACCEPTED.

Pledge: I, _____, pledge my honor as a human being and Occidental student, that I have followed all the rules above to the letter and in spirit.

Math 214 Spring 2007 **SHOW ALL YOUR WORK** **BONUS** Quiz 2

1. *6 points.* Consider the linear system

$$\begin{aligned} 4x - 2y + z &= a \\ x + y + z &= b \end{aligned}$$

where a and b are real numbers. Our goal is to discover a relationship between the solution sets of this system for various values of a and b.

a. *2 points.* Consider the case $a = b = 0$. This is known as the **homogeneous** case. Use Gaussian Elimination to solve the system.

b. *2 points.* What is the geometric interpretation or "shape" of the solution? Is it a point in $\mathbb{R}^2$? A point in $\mathbb{R}^3$? A line in $\mathbb{R}^2$? A line in $\mathbb{R}^3$? A plane in $\mathbb{R}^3$? Something else?

c. *2 points.* Express your solution in vector form, i.e. $\vec{x} = \vec{p} + t\vec{d}$.

2. *4 points.* Choose any non-zero value of a and b that you like. This is known as the **non-homogeneous** case.

a. *2 points.* Repeat **Question 1** (i.e. Use Gaussian Elimination to solve the system with your chosen values of a and b) and express your answers in vector form, i.e. $\vec{x} = \vec{p} + t\vec{d}$.

b. *2 points.* What is the (geometric) relationship between your solutions in **1(c)** and **2(a)**? In other words, how are the solutions to the homogeneous linear system and non-homogeneous linear system related? EXPLAIN YOUR ANSWER.