Overview of Section 1.5, 1.6

1. **Vocabulary List:**
   (a) Homogeneous System.
   (b) Non-homogeneous System. (*It is "Non" not "In"*)
   (c) Parametric vector equation.
   (d) Linearly (in)dependent
2. **Key Concepts:**
   (a) The $m \times n$ system of linear equations $Ax = 0$ is always consistent and hence has either a unique solution or infinitely many solutions. Always infinitely many when $m < n$.
   (b) The relationship between the solutions of $Ax = 0$ and $Ax = b$. (Theorem 6)
   (c) Meaning of Linear independence geometrically.
   (d) Theorem 7, and Theorem 8.
3. **Skills to Master:**
   (a) Describing a solution set of $Ax = 0$ as a span of collection of vectors.
   (b) Describing a spanning set of the columns of A, i.e describing the condition required on all b that are in the spanning set of the columns of A..i.e describing the condition required on all b such that $Ax = b$ will be consistent.
   (c) Decide whether a set of vectors in Linearly independent or not.
   (d) If a set of vectors is Linearly dependent, then expressing one of them as a linear combination of the others.
4. **Other:** Try to read Example 4 on page 53. It is an application to Economics.

Homework Set no.	Date	Section	Problems
Homework Set 8	Jan. 23rd, 2001	1.7	31,35,38
		1.8	1,3,5,12,15,19,23,24,35
Homework Set 9	Jan. 24th, 2001	2.1	1,4,5,11,17,19-24,25
Homework Set 10	Jan. 27th, 2001	2.2	1,4,5,7,9,10,14,23,32

Office hours: After reviewing the pink sheets, I have tried to come up with office hours that satisfy a significant majority of people. These are listed below in the footnote (as in every typed handout that is given out).

[1] **Office hours:** Monday 1.30-3pm, 5-6pm, Wednesday 2:30-3:30, Thursday at 1:30-3:00pm, Friday 11.30-12.30 or by appointment.

Math 221 **202** **(Take home) Quiz 3** **Score**

Your name ______________________ **Student #**

Due: Tuesday, January 23rd at 10.00am

Ground Rules:
1. Open book and notes. You may consult anyone you want, but you must write up your own solutions.
2. Show your work. Explain your solutions clearly.
3. When you submit the quiz back on Tuesday, please use this sheet as the first page.
4. The grader will choose two out of these 8 problems and grade them.
5. Maximum possible score will be 25. There will be 4 points for completion and 1 point for attaching this sheet. No points for turning in this sheet without the quiz.
6. Please turn in the quiz in person as you enter the class (no later than 10.15 am).

Syllabus: 1.4, 1.5, 1.6 Solve the following questions:
1. Section 1.5: 22,26
2. Section 1.6: 16,28,30,
3. Let v_1, v_2, v_3 be three vectors in $\mathbf{R^5}$. Let $v_4 = v_1 - 3v_2 + 2v_3$. Exhibit $3v_1 + 8v_2 + 9v_3 - 4v_4$ as a linear combination of v_1, v_2 and v_3. Show that the Span$\{v_1, v_2, v_3\}$ = Span$\{v_1, v_2, v_3, v_4\}$

4. Consider the two vectors $v_1 = \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$, $v_2 = \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}$ and $v_3 = \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$ in R^3. Describe the condition that the vectors in the span$\{ v_1, v_2, v_3 \}$ have to satisfy and also what is the span geometrically.

5. Consider the vectors

$$u = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}, \quad v = \begin{bmatrix} 2 \\ 1 \\ -3 \end{bmatrix}, \quad \text{and} \quad w = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}.$$

Determine whether these vectors are linearly independent or linearly dependent. If they are linearly dependent, express one of the vectors as a linear combination of the others.

Quote of the week: "*Nobody goes there anymore; its too crowded* "- *Yogi Berra*