KOÇ UNIVERSITY

MATH 107 - LINEAR ALGEBRA

Midterm I March 18, 2015

Duration of Exam: 75 minutes

INSTRUCTIONS: CALCULATORS ARE ALLOWED FOR THIS EXAM. No books, no notes, no questions and no talking allowed. You must always **explain your answers** and **show your work** to receive **full credit**. Use the back of these pages if necessary. **Print (use CAPITAL LETTERS) and sign your name, and indicate your section below.**

Name: ______________________________

Surname: ______________________________

Signature: ___________________________________

Section (Check One):

Section 1: E. Şule Yazıcı M-W(10:00) ___
Section 2: E. Şule Yazıcı M-W(13:00) ___
Section 3: Haluk Oral M-W(14:30) ___
Section 3: Haluk Oral M-W(16:00) ___

PROBLEM	POINTS	SCORE
1	20	
2	15	
3	15	
4	30	
5	10	
6	15	
TOTAL	**105**	

1. (20 points) Solve the following system of linear equations by row reducing the associated augmented matrix. Find the row reduced echelon form of the matrix. Write the solution set and find two particular solutions for the system if there exist more than one solution.

$$\begin{cases} \begin{aligned} x_1 + 2x_3 - 2x_5 &= 11 \\ x_2 - 3x_4 - x_5 &= 0 \\ 2x_1 + 5x_3 - 4x_5 &= 27 \\ 3x_1 + 2x_2 + 7x_3 - 6x_4 - 8x_5 &= 38 \end{aligned} \end{cases}$$

2. (15 points) Let V be a vector space and $S = \{v_1, v_2, ...v_n\} \subseteq V$. Prove that if S is linearly independent then for every $v \in S$, $v \notin Span(S \backslash \{v\})$. (Note: In a vector space V with $A \subseteq V$, Span(A) is the subspace generated by the set A)

3. (15 points) Let $V = \{(2c, a - b, b - 3c, a + 2b) | \ a, b, c \in \mathbb{R}\}$. Find a basis for V and compute its dimension.

4. (a)(15 points) Let $S = \{(1,-2,3),(2,3,1)\}$. Find the coordinates of $(4,-1,7)$ in the $Span(S)$ with respect to the basis S .

(b)(15 points) Show that $T = \{(1,-2,3),(2,3,1),(0,0,1)\}$ is linearly independent.What is $span(T)$ =?

5. (10 points) Find the cosine of the angle between the vectors $A = (1, -2, 3)$ and $B = (2, 3, 1)$ in $\mathbb{R}^3$

6. (15 points) Show that $V = \{(a, a, a) |\ a \in \mathbb{R}\}$ is a subspace of $\mathbb{R}^3$