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University of Ottawa

Department of Mathematics and Statistics

MAT 1341: Introduction to Linear Algebra

Instructor: Erhard Neher

Assignment 1; due May 26, 2008, 17:00 in the class room

Family Name: _____

First Name: _____

Student number: _____

Please read these instructions carefully:

- The table below is for the TA. Do not write in the table.
- The assignment has to be submitted with the two cover pages. You may or may not use the pages 3-7 of this copy.
- For privacy reasons, this page of the assignment will be detached, and you will only get back the remaining pages of the assignment. Therefore, **fill in your name on both pages and your student number on this page only.**

Quest.	1.	2.	3.	4.	Total
maximal	3	7	5	12	27
score					

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Family Name: _____

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Please read these instructions carefully:

- All questions require justification, written legibly and logically: You must convince the TA and me that you know why your solution is correct. Correct answers without justification will get 0 marks.
- You have to submit this assignment at the beginning of the class on Monday, May 26, 2008, at 17:00 in the classroom at the latest. If you wish to submit it earlier, please do so at the secretariat of the Department of Mathematics, room 103A, 8:45–12:00 and 13:00–17:00.

Good luck! Bonne Chance!

1. (3 points) Find A if $A^T - 3\begin{bmatrix} i & -1 & 4 \\ 7 & 3 & \alpha \end{bmatrix} = (2+i)\begin{bmatrix} 4-i & 7 & 2i \\ 3 & 1+i & 9 \end{bmatrix}$, where α **is the last digit of your student number.**

My answer:_____

2. In each case either show that the statement is true or give an example with concrete numbers showing that it is false. Assume that a linear system is given with augmented matrix A and coefficient matrix C. Let R be the reduced row-echelon form of A.

(a) **(1 point)** A and R have the same size.

(b) **(2 points)** If there is more than one solution, R must have a row of zeros.

(c) **(2 points)** If there are more variables than equations, there are infinitely many solutions.

(d) **(1 point)** If the system has a solution, $\text{rank}\,(A) = \text{rank}\,(C)$.

(e) **(1 point)** $\text{rank}\,(A) \leq 1 + \text{rank}\,(C)$.

3. (5 points) Exercise 13 of section 1.2.

4. (12 points) Determine for which value(s) of a the linear system

$$\begin{array}{rcrcrcr} 2x & + & y & - & z & = & 0 \\ 3ax & + & 3y & + & 12z & = & -5 \\ 3x & & & + & az & = & 1 \end{array}$$

has
(a) no solution,
(b) infinitely many solutions, and
(c) a unique solution.
In case (b) write down all solutions.
(Distribution of points: row reduction 4 points, 2 points for each of the 3 cases, solutions in (b): 2 points.

(extra page)