Page 1

University of Ottawa

Department of Mathematics and Statistics

MAT 1341 B: Introduction to Linear Algebra

Instructor: Erhard Neher

Assignment 1; due Sept. 20, 2007, 17:30 in the class room

Family Name: _____

First Name: _____

Student number: _____

Please read these instructions carefully:

- Enter your name on this page and the next, but your student number only on this page. You will get back the assignment without this first page.
- The table below is for the TA. Do not write in the table. 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	4	7	5	5	21
score					

Page 2

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Family Name: _____

First Name: _____

Please read these instructions carefully:

- Read each question carefully, and answer all questions in the space provided after each question. You may use the backs of pages if necessary, but be sure to indicate to the marker that you have done this.
- For all questions you must show your work to obtain the points. Simply writing the correct answer will earn you 0.
- Please write legibly and argue logically: You must convince the TA that you know why your solution is correct.
- You have to submit this assignment at the beginning of the DGD on Thursday, Sept. 20, 2007, at 17:30 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, or at the beginning of my Thursday lecture.

1. (a) (2 points) Let α be the last digit of your student number. Write

$$\frac{\alpha + 5i}{7 - 3i}$$

in the form $a + ib$ where $a, b \in \mathbb{R}$.

My answer:_____

(b) (2 points) Find all roots of $z^3 + 4z^2 + 6z = 0$

My answer:_____

2. (a) (3 points) Find the intersection point of the lines

$$\begin{aligned} x &= 1 - 3t & x &= -1 + s \\ y &= 2 + 5t & y &= 3 - 4s \\ z &= 1 + t & z &= 1 - s \end{aligned}$$

My answer:_____

(b) (4 points) Let L be the line through the point $A(3, 1, 1)$ with direction vector $\overrightarrow{d} = [\,-1 \quad 1 \quad 0\,]^T$. Find the point on the line L that is closest to the point $B(1, \beta, 7)$ where β is the **second last digit** of your student number, and find the shortest distance from B to L.

My answer:_____

3. (a) (3 points) Determine an equation of the plane containing the lines

$$[\,3 \quad 1 \quad 0\,]^T + t\,[\,1 \quad 2 \quad 3\,]^T \quad \text{and} \quad [\,2 \quad 4 \quad 22\,]^T + t\,[\,-1 \quad -1 \quad 2\,]^T.$$

My answer:_____

(b) (2 points) Find the equation of the plane passing through the point $P(1, -2, 1)$ and parallel to the plane $3x - 2y + z = 5$.

My answer:_____

4. (a) (3 points) Find the volume of the parallelepiped determined by the vectors $A(-1, 0, \gamma)$, $B(2, 1, 1)$ and $C(-1, -1, 3)$, where γ is the third last digit of your student number.

My answer:_____

(b) (2 points) Find the area of the triangle with vertices $P(1, 2, -3)$, $Q(1, 1, 0)$ and $R(2, 3, 0)$.

My answer:_____