University of Ottawa

Department of Mathematics and Statistics

MAT 1341: Introduction to Linear Algebra

Instructor: Erhard Neher

Diagnostic Test   May 8, 2006

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 exam without this first page.
- You have 60 minutes to complete this exam.
- This is a closed book exam, and no notes of any kind are allowed. The use of calculators, cell phones, pagers or any text storage or communication device is not permitted.
- Read each question carefully - you will save yourself time and unnecessary grief later on.
- All 9 questions are multiple choice, are worth 1 point each and no part marks will be given. Please record your answers in the space provided.
- Where it is possible to check your work, do so.

Good luck! Bonne chance!

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1. The area of the triangle with vertices $A(1,1,1)$, $B(0,1,2)$ and $C(1,0,2)$ is

A. $\frac{1}{2}\sqrt{2}$

B. $\frac{1}{2}\sqrt{3}$

C. $\sqrt{2}$

D. $\frac{3}{2}$

E. 5

F. 2

My answer:________________

2. The shortest distance from the point $P(2,7,9)$ to the line through $P_0(-1,-2,0)$ with direction vector $\overrightarrow{d} = [-1 \quad 2 \quad 5]^T$ is

A. $\sqrt{51}$

B. $\sqrt{37}$

C. 3

D. $\sqrt{20}$

E. 0

F. 4

My answer:________________

3. The equation of the plane through $P(2, 1, -1)$ and perpendicular to the line through $Q(4, 3, -2)$ and $R(2, 1, 0)$ is

A. $x + y - z = 4$

B. $2x + y - z = 6$

C. $3x - y - z = 6$

D. $2x + y - z = 0$

E. $4x + 3y - 2z = 1$

F. $2x + y = 5$

My answer:_______________

4. The equation of the plane through $P(1, 1, 0)$ and parallel to the plane through $A(3, -1, 0)$ and $B(4, 1, 1)$ and $C(0, 1, 0)$ is

A. $7x + 4y = 11$

B. $3x - y + 4z = 2$

C. $4x + y + z = 5$

D. $-3x + 2y - 4z = -1$

E. $2x + 3y - 8z = 5$

F. $4x - 4y + 2z = 0$

My answer:_______________

5. The vector equation of the line through $P(8,4,3)$ and parallel to the line through $A(4,-1,2)$ and $B(-1,3,0)$ is

A. $[1 \quad 0 \quad 3]^T + t\,[7 \quad 4 \quad 0]^T$

B. $[3 \quad 0 \quad 2]^T + t\,[5 \quad 9 \quad -2]^T$

C. $[1 \quad 1 \quad 1]^T + t\,[0 \quad 3 \quad 7]^T$

D. $[6 \quad 2 \quad 1]^T + t\,[2 \quad 2 \quad 2]^T$

E. $[13 \quad 0 \quad 5]^T + t\,[5 \quad -4 \quad 2]^T$

F. $[1 \quad 0 \quad 3]^T + t\,[5 \quad 9 \quad 2]^T$

My answer:_______________

6. The volume of the parallelepiped defined by the three vectors $\overrightarrow{u} = [1 \quad -1 \quad 0]^T$, $\overrightarrow{v} = [2 \quad 1 \quad 3]^T$ and $\overrightarrow{w} = [4 \quad 1 \quad -1]^T$ is

A. -9

B. 9

C. 4

D. 18

E. 5

F. 3

My answer:_______________

7. Find the vector equation of the line through $P(1,0,3)$, intersecting the line $[\,x \quad y \quad z\,]^T = [\,3 \quad 4 \quad 0\,]^T + t\,[\,1 \quad -1 \quad 0\,]^T$ and perpendicular to that line.

A. $[\,1 \quad 0 \quad 3\,]^T + t\,[\,2 \quad 2 \quad -5\,]^T$

B. $[\,1 \quad 0 \quad 3\,]^T + t\,[\,1 \quad 1 \quad -1\,]^T$

C. $[\,3 \quad 0 \quad 4\,]^T + t\,[\,7 \quad 3 \quad 2\,]^T$

D. $[\,-10 \quad -7 \quad 1\,]^T + t\,[\,11 \quad 7 \quad -4\,]^T$

E. There is no such line

F. $[\,3 \quad 4 \quad 0\,]^T + t\,[\,-2 \quad -5 \quad 3\,]^T$

My answer:________________

8. The roots of the quadratic polynomial $x^2 - 8x + 18$ are

A. $7 \pm \sqrt{5}\,i$

B. $-2 \pm \sqrt{5}\,i$

C. $5 \pm \sqrt{3}\,i$

D. $-2 \pm \sqrt{3}\,i$

E. $-3 \pm i$

F. $4 \pm \sqrt{2}\,i$

My answer:________________

9. The complex number z satisfying $(2+i)z + (3-i) = (3-2i)z + (1-2i)$ is

A. $\frac{1}{10}(-1+7i)$

B. $\frac{1}{5}(-2-i)$

C. $\frac{1}{5}(2+3i)$

D. $\frac{1}{10}(-1-i)$

E. $\frac{1}{5}(1+i)$

F. $\frac{1}{5}(-2-3i)$

My answer:_______________