MAT 1341, INTRODUCTION TO LINEAR ALGEBRA, WINTER 2003

OAC Diagnostic Test, January 17

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NAME: ______________________________ **ID:** ________________

Problem:	1	2	3	4	5	6	7	8	9	10	11	12
Answer:												

PLEASE READ THESE INSTRUCTIONS CAREFULLY.

1. You have 80 minutes to complete this test.
2. This is a closed book test, and no notes of any kind are allowed. The use of calculators is not permitted. Some values of sine and cosine are provided below.
3. Read each question carefully — you will save yourself time and unnecessary grief later on.
4. All questions are multiple choice, are worth 1 point each and no partial credit will be given. Please record your answers in the space provided above.
5. Where it is possible to check your work, do so.
6. Good luck!

θ	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\sin\theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0

Problem 1. An equation of the plane parallel to the vector (1, 1, -2) and which passes through the points (1, 5, 18) and (4, 2, -6) is:

A. $5x + 9y + 18z = 8$

B. $7x - 9y + 18z = 8$

C. $5x - 3y + z = 8$

D. $5x - 7y - z = 8$

E. $x + 18y + 9z = 8$

F. $9x - 6y + 5z = 8$

Problem 2. Parametric equations for the line containing $(3,\ -1,\ 4)$ and $(-1,\ 5,\ 1)$ are:

A. Such a line does not exist.

B. $x = 3 + 4t,\ y = 3 + 6t,\ z = 4 + 3t$

C. $x = 1 - t,\ y = -1 - 6t,\ z = 4 + 3t$

D. $x = 3 + 4t,\ y = -1 - 6t,\ z = 6 + t$

E. $x = 3 + 4t,\ y = -1 - 6t,\ z = 4 + 3t$

F. $x = 1 - t,\ y = 3 + 6t,\ z = 6 + t$

Problem 3. If $\mathbf{u} = (1,\ 1,\ -1),\ \mathbf{v} = (0,\ 2,\ -1)$ and $\mathbf{w} = (1,\ -3,\ 3)$, find $\|\mathbf{v} \times \mathbf{w}\|(\mathbf{u} \times \mathbf{w})$.

A. $\sqrt{14}\,(0,\ 4,\ 4)$

B. $\sqrt{14}\,(0,\ 4,\ -4)$

C. $-\sqrt{14}\,(0,\ 4,\ -4)$

D. $-\sqrt{14}\,(0,\ 4,\ 4)$

E. $2\sqrt{7}\,(0,\ 4,\ 4)$

F. $-2\sqrt{7}\,(0,\ 4,\ -4)$

Problem 4. Which of the following is a normal vector to the plane containing the points (-7, 1, 0), (2, -1, 3) and (4, 1, 6)?

A. (12, 87, 22)

B. (-12, -21, 22)

C. (8, 1, 4)

D. (1, 2, 3)

E. (0, 5, 8)

F. (0, 1, 0)

Problem 5. The distance from the point (2, 2, 3) to the plane $3x - y + 2z = 10$ is:

A. $10/\sqrt{14}$

B. $20/\sqrt{14}$

C. 0

D. $\sqrt{14}$

E. $5/\sqrt{14}$

F. $15/\sqrt{14}$

Problem 6. The angle between (0, 3, -3) and (-2, 2, -1) is:

A. $\pi/6$

B. $\pi/2$

C. $\pi/4$

D. $\pi/3$

E. $\pi/5$

F. $\pi/7$

Problem 7. If $\mathbf{u} = (3,\ 3,\ 6)$ and $\mathbf{v} = (2,\ -1,\ 1)$ then the length of the projection of $\mathbf{u}$ along $\mathbf{v}$ is:

A. $(3\sqrt{6})/2$

B. $(3\sqrt{2})/2$

C. 0

D. $\sqrt{6}/2$

E. $(2\sqrt{6})/3$

F. $(2\sqrt{2})/3$

Problem 8. Find the volume of the parallelepiped determined by the vectors $\mathbf{u} = (1,\ 1,\ -1)$, $\mathbf{v} = (2,\ 0,\ 1)$ and $\mathbf{w} = (1,\ -1,\ 3)$.

A. -2

B. 4

C. 6

D. 8

E. 16

F. 2

Problem 9. Consider the line which passes throught the point (5, 1, -2) and which is perpendicular to the plane $12x - y + 3z = 4$. Find the point where this line meets the plane $2x + y + z = 19$.

A. $(125/13,\ -8/13,\ -11/13)$

B. $(-125/13,\ 8/13,\ 11/13)$

C. $(60/13,\ -8/13,\ -2)$

D. $(125/13,\ 8/13,\ -11/13)$

E. $(-60/13,\ -8/13,\ -24/13)$

F. $(-60/13,\ 8/13,\ 11/13)$

Problem 10. Find the distance from the point (8, 6, 11) to the line containing the points (0, 1, 3) and (3, 5, 4).

A. 1

B. 3

C. 5

D. 7

E. 9

F. 11

Problem 11. Convert the complex number

$$\frac{(16+13i)(1+2i)}{10+5i}$$

to the form a + i b.

A. 3

B. $1+4i$

C. $1-4i$

D. $(1/5)+(4/5)i$

E. $-(1/5)+(4/5)i$

F. $4i$

Problem 12. The polar form of

$$\frac{3\sqrt{3}-3i}{\sqrt{2}+i\sqrt{2}}$$

is:

A. $6(\cos(-\pi/12)+i\sin(-\pi/12))$

B. $3(\cos(-\pi/12)+i\sin(-\pi/12))$

C. $3(\cos(5\pi/12)+i\sin(5\pi/12))$

D. $3(\cos(-5\pi/12)+i\sin(-5\pi/12))$

E. $2(\cos(-5\pi/12)+i\sin(-5\pi/12))$

F. $2(\cos(\pi/12)+i\sin(\pi/12))$