MAT 1341A Diagnostic test 2011

September 17, 2011. Duration: 80 minutes

Instructor: Barry Jessup

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

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total	

Family Name:_____

First Name:_____

Student number:_____

PLEASE READ THESE INSTRUCTIONS CAREFULLY.

1. You have 80 minutes to complete this exam.
2. This is a closed book exam, and no notes of any kind are allowed. The use of any text storage or communication device is not permitted.
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 part marks 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! Bonne chance!

1. An equation of the plane parallel to the vector $(1, 1, -2)$ and which passes through the points $(1, 0, 3)$ and $(0, 1, 11)$ is:

A. $5x - 11y + 2z = 11$
B. $7x - 9y + 2z = 13$
C. $5x - 7y - z = 2$
D. $5x - 3y + z = 8$
E. $x + 18y + 9z = 8$
F. $9x - 6y + 5z = 8$

2. Parametric equations of the line containing $(2,\ 0,\ 1)$ and which is parallel to the two planes $x - y + 3z = 0$ and $3x - 5y + 4z = 1$ are:

A. $x = 2 + 11t$, $y = 5t$, $z = 1 + 2t$, $t \in \mathbf{R}$
B. $x = -2 + 5t$, $y = -5t$, $z = 1 - 10t$, $t \in \mathbf{R}$
C. $x = -2t$, $y = 0$, $z = t$, $t \in \mathbf{R}$
D. $x = -2 + 11t$, $y = -3t$, $z = 1 + 2t$, $t \in \mathbf{R}$
E. $x = 2t$, $y = 0$, $z = t$, $t \in \mathbf{R}$
F. $x = 2 + 11t$, $y = 5t$, $z = 1 - 2t$, $t \in \mathbf{R}$

3. If $u = (1,\ 3,\ -2),\ v = (0,\ 2,\ -1),\ w = (1,\ -1,\ 2)$ then the cosine of the angle between $(v \times w)$ and $(u \times v)$ is:

A. $\dfrac{2}{21}$

B. $-\dfrac{1}{21}$

C. $\dfrac{\sqrt{2}}{\sqrt{21}}$

D. $-\dfrac{1}{\sqrt{7}}$

E. $-\dfrac{1}{\sqrt{21}}$

F. $\dfrac{2}{\sqrt{7}}$

4. If $\mathbf{u} = (1,\ 0,\ 1)$ and $\mathbf{v} = (-3,\ 4,\ 10)$, the orthogonal projection of $\mathbf{v}$ along $\mathbf{u}$ is:

A. $(7, 0, 7)$

B. $(-7, 0, -7)$

C. $(-\dfrac{7}{2},\ 0,\ -\dfrac{7}{2})$

D. $(\dfrac{7}{2},\ 0,\ \dfrac{7}{2})$

E. $(\dfrac{11}{2},\ 0,\ \dfrac{11}{2})$

F. $(-\dfrac{11}{2},\ 0,\ -\dfrac{11}{2})$

5. The volume of the parallelepiped with edges given by the vectors $u = (1,\ 1,\ 1)$, $v = (1,\ 3,\ 2)$ and $w = (1,\ 1,\ 3)$ is:

A. 2

B. $\dfrac{\sqrt{2}}{2}$

C. $1/\sqrt{2}$

D. $1\sqrt{2}$

E. 4

F. $4\sqrt{2}$

6. Find the area of the triangle with vertices $A = (0,\ 6,\ 1)$, $B = (2,\ 1,\ 5)$ and $C = (2,\ 5,\ 1)$.

A. 1
B. 2
C. 3
D. 4
E. 5
F. 6

7. Let L be the line passing through $(1,\ 1,\ 0)$ and $(3,\ 5,\ 2)$. The point of intersection of L with the plane $x + y - z = 1$ is:

A. $(\frac{1}{2},\ \frac{1}{2},\ 0)$

B. $(\frac{1}{2},\ 0,\ -\frac{1}{2})$

C. $(1,\ 0,\ 0)$

D. $(0,\ \frac{1}{2},\ -\frac{1}{2})$

E. $(0,\ 1,\ 0)$

F. $(-1,\ 0,\ -1)$

8. Find the intersection of the lines $x = 2 + 2s,\ y = 2 - s,\ z = 2 - 2s$ and $x = 4 + 5t,\ y = 3 - t,\ z = 4 - 2t$.

A. $(6,\ 7,\ -4)$

B. $(-4,\ 8,\ 3)$

C. $(4,\ 4,\ 4)$

D. $(2,\ 0,\ -2)$

E. $\frac{1}{3}(14,\ -23,\ 13)$

F. $\frac{1}{3}(-8,\ 13,\ 20)$

9. Find a scalar equation for the plane with vector parametric equation

$$v = (0, 2, -2) + s(1, -1, 2) + t(4, -6, 3); s, t \in \mathbf{R}.$$

A. $4x - 9y + 36z = 18$

B. $9x + 5y - 2z = 14$

C. $7x - 8y + 5z = 6$

D. $9x - 11y + 18z = -40$

E. $9x - 2y + 2z = 0$

F. $3x + 2y - z = 0$

10. The distance from the point (5, 0, 0) to the plane $2x - y + 8z = -3$ is:

A. $\dfrac{13}{\sqrt{69}}$

B. $\dfrac{19}{\sqrt{69}}$

C. $\dfrac{15}{\sqrt{69}}$

D. 0

E. $\dfrac{13}{69}$

F. $\dfrac{19}{69}$

11. Evaluate $\mathrm{Im}(z)$ if

$$z = \frac{1}{(-1+i)(2-2i)}.$$

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

B. $-\frac{1}{2}$

C. $-\frac{1}{5}$

D. $\frac{1}{4}$

E. $-\frac{1}{4}$

F. 1

12. Find the polar form of:

$$\frac{1+i\sqrt{3}}{-\sqrt{2}+i\sqrt{2}}$$

A. $2(\cos(-\frac{\pi}{12}) + i\sin(-\frac{\pi}{12}))$

B. $\cos(-\frac{\pi}{12}) + i\sin(-\frac{\pi}{12})$

C. $\cos(\frac{5\pi}{12}) + i\sin(\frac{5\pi}{12})$

D. $\cos(-\frac{5\pi}{12}) + i\sin(-\frac{5\pi}{12})$

E. $2(\cos(-\frac{5\pi}{12}) + i\sin(-\frac{5\pi}{12})$

F. $2(\cos(\frac{\pi}{12}) + i\sin(\frac{\pi}{12}))$