MAT 1341C Test 1- Diagnostic test 2015

January 24 - 2015. 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 permitted. The use of calculators, cell phones, or similar devices is not permitted. All implanted cyber devices not necessary for life-support must be disabled at the beginning of the exam.
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 spaces provided next to the question numbers above.
5. Where it is possible to check your work, do so.
6. Good luck! Bonne chance!

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

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

2. Which two of the following are vector parametric descriptions for the plane with equation $x + y - 2z = 4$?

I. $v = (0, 0, 0) + s\ (0, 2, 1) + t\ (2, 0, 1); s, t \in \mathbf{R}$.
II. $v = (4, 0, 0) + s\ (1, -1, 0) + t\ (0, 2, 1); s, t \in \mathbf{R}$.
III. $v = (4, 0, 0) + s\ (1, 1, 1) + t\ (1, 1, 0); s, t \in \mathbf{R}$.
IV. $v = (0, 0, -2) + s\ (1, -1, 0) + t\ (2, 0, 1); s, t \in \mathbf{R}$.

A. I & II
B. I & III
C. I & IV
D. II & III
E. II & IV
F. III & V

3. An equation for the plane parallel to the x–axis and passing through the points $(2, 1, -1)$ and $(3, 2, 1)$ is:

A. $-3x + 7y - 2z = 3$
B. $x - y = 1$
C. $2y - z = 3$
D. $2x - z = 5$
E. $x + y - z = 4$
F. $x + y + z = 2$

4. Find an equation of the plane which passes through the point $(1,\ -7,\ 8)$ and which is perpendicular to the line whose (scalar) parametric equations are:

$$x = 2 + 2t, \quad y = 7 - 4t, \quad z = -3 + t; \quad t \in \mathbf{R}.$$

A. $2x - 4y + z = -38$
B. $-4x + 2y + z = -10$
C. $-4x + 2y + z = 10$
D. $2x - 4y + z = 38$
E. $2x + 7y - 3z = -71$
F. $2x - 4y + z = -28$

5. One of the following is an equation for the plane with vector parametric description

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

Which is it?

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

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

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

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

E. $x - z = -1$

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

6. Find the polar form of

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

A. $\sqrt{2}(\cos(-7\pi/12) + i\sin(-7\pi/12))$

B. $\sqrt{2}(\cos(5\pi/12) + i\sin(5\pi/12))$

C. $\sqrt{2}(\cos(-\pi/12) + i\sin(-\pi/12))$

D. $\sqrt{2}(\cos(\pi/12) + i\sin(\pi/12))$

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

F. $\sqrt{2}(\cos(11\pi/12) + i\sin(11\pi/12))$

7. What is the area of the triangle with vertices $(3,\ 0,\ -2)$, $(5,\ 2,\ -1)$ and $(5,\ 9,\ 0)$?

A. 13/2
B. 15/2
C. 17/2
D. 10
E. 13
F. 15

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

A. $(1/2,\ 1/2,\ 0)$
B. $(0,\ 1/2,\ -1/2)$
C. $(0,\ 1,\ 0)$
D. $(1/2,\ 0,\ -1/2)$
E. $(1,\ 0,\ 0)$
F. $(-1,\ 0,\ -1)$

9. Express the following complex numbers in the form $a + b\,i$:

$$z_1 = \frac{i}{-1+i}$$

$$z_2 = (2+i)(1+i)$$

A. $z_1 = \dfrac{1}{2} + \dfrac{1}{2}i \ ; \ z_2 = 1 - 3i$

B. $z_1 = \dfrac{1}{2} - \dfrac{1}{2}i \ ; \ z_2 = 1 + 3i$

C. $z_1 = 1 - i \ ; \ z_2 = 2 + 2i$

D. $z_1 = -1 + i \ ; \ z_2 = 1 + 2i$

E. $z_1 = 2 - \dfrac{1}{4}i \ ; \ z_2 = 3 - i$

F. $z_1 = 1 - i \ ; \ z_2 = 2$

10. If $v = (2,\ 2,\ 2)$ and $u = (-1, 0, -1)$ then $\text{proj}_u\, v =$

A. $\frac{4}{9}(2, 1, 2)$

B. $\frac{12}{7}(3,\ 3,\ 3)$

C. $\frac{4}{3}(2, 1, 2)$

D. $(2, 0, 2)$

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

F. $\frac{11}{7}(3,\ 3,\ 3)$

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

A. 6

B. 8

C. 16

D. 2

E. 4

F. -2

12. If $A = (1, 2, 1),\ B = (2, 2, 1)$ and $C = (2, 2, 2)$, find the angle $\angle ACB$.

A. $\pi/4$

B. $\pi/6$

C. $3\pi/4$

D. $4\pi/3$

E. $\pi/2$

F. $\pi/3$