Math 200 Sample Test 3 – Nov 2011

Question 1 : Evaluate $I = \int\int_R (x-y)dA$, where R is the region bounded by $y^2 = 3x$ and $y^2 = 4 - x$.

Question 2: Find the points on the cone $x^2 = y^2 + z^2$ nearest to the point (0,1,3).

Question 3: Find the area bounded by the graph $r^2 = \sin(\theta)$.

Question 4 : Use a triple integral to find the volume inside the cylinder $r = 4$, above $z = 0$ and below $2z = y$.

Question 5 : Find the centroid of the upper half of the solid ball of radius a with center at the origin.

Question 6 : Evaluate

$$\int_0^2 \int_0^{\sqrt{2x-x^2}} \frac{x-y}{x^2+y^2} dydx.$$

Math 200 Test 1 – Sep 28 2011

name (printed)

student number

I have read and understood the instructions below:

signature

Instructions: Justify every answer, and clearly show your work. Unsupported answers will receive no credit.

You will be given 80 minutes to write this test. Read over the test before you begin.

At the end of the test you will be given the instruction "Put away all writing implements and remain seated." *Continuing to write after this instruction will be considered as cheating.*

Academic dishonesty: Exposing your paper to another student, copying material from another student, or representing your work as that of another student constitutes academic dishonesty. Cases of academic dishonesty may lead to a zero grade in the test, a zero grade in the course, and other measures, such as suspension from this university.

Question	value
1	6
2	7
3	10
4	7
5	9
6	6
Total	**45**

Question 1:

[**6 points**] Find an equation of the plane through $P(2, -3, 2)$, and the line L determined by the planes $6x + 4y + 3z + 5 = 0$ and $2x + y + z - 2 = 0$.

Question 2

[7 points] If $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} = \overrightarrow{0}$**, show that** $\overrightarrow{a} \times \overrightarrow{b} = \overrightarrow{b} \times \overrightarrow{c} = \overrightarrow{c} \times \overrightarrow{a}$.

Question 3 Identify and sketch the surfaces

[5 points]

$$x^2 - y^2 - 1 = 0$$

(b)[5 points]

$$x^2 - y^2 - z^2 = 4.$$

Question 4

[7 points] Use vectors $\overrightarrow{a} = \langle 2, -2, 1\rangle$ $\overrightarrow{b} = \langle 0, -1, 1\rangle$ **and** $\overrightarrow{c} = \langle 1, -1, 0\rangle$**, to prove (disprove)**

$$(\overrightarrow{a} \times \overrightarrow{b}) \times \overrightarrow{c} \neq (\overrightarrow{b} \times \overrightarrow{c}) \times \overrightarrow{a}.$$

Question 5:

(a)[5 points] Show that the triangle with vertices $P(4,3,6)$, $Q(-2,0,8)$ $R(1,5,0)$ is a right triangle.

(b)[4 points] Find parametric equation of the line that contains point P and parallel to the line RQ.

Question 6

[7 points] Find all vectors $\overrightarrow{a}$ <u>in the plane</u> such that $|\overrightarrow{a}| = 1$ and $|\overrightarrow{a} + \overrightarrow{i}| = 1$, where $\overrightarrow{i} =< 1, 0, 0 >$.

Math 200 Test 2 – October 26 2011

name (printed)	*student number*

I have read and understood the instructions below: ______________ *signature*

Instructions: Justify every answer, and clearly show your work. Unsupported answers will receive no credit.

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Question	value
1	6
2	6
3	9
4	9
5	8
6	6
7	8
Total	**52**

Question 1:

[**6 points**] Show that the surfaces $x^2 + y^2 + z^2 = 18$ and $xy = 9$ are tangent at $(3, 3, 0)$.

Question 2

[**6 points**] Sketch the domain of $f(x, y) = \sqrt{\frac{x^2}{9} - y^2 - 1}$.

Question 3

[9 points] Verify that $f(x,y) = \frac{xy}{x-y}$ satisfies the equation $x^2 f_{xx} + y^2 f_{yy} + 2xy f_{xy} = 0$.

Question 4

[**9 points**] If a point is moving on the curve of intersection of $x^2 + 3xy + 3y^2 = z^2$ and the plane $x - 2y + 4 = 0$, how fast is it moving when $x = 2$, if x is increasing at the rate of 3 units per second?

Question 5:

[**8 points**] Find all relative extreme of $f(x, y) = (x - y)(1 - xy)$.

Question 6:

[**6 points**] Is there a function $f(x, y)$ such that $f_x = e^x \cos y$ and $f_y = e^x \sin y$? Explain.

Question 7:

[**8 points**] For $f(u, v) = \ln(u + v)$ where $u = \sin x - \cos y$ and $v = x \sin y$ compute f_{xy}.

Math 200 Test 3 November 23 2011

name (printed)

student number

I have read and understood the instructions below:

signature

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Question	value
1	10
2	10
3	10
4	10
5	10
Total	**50**

Question 1:

[**10 points**] Find the volume of the wedge cut from the elliptical cylinder $9x^2 + 4y^2 = 36$ by the planes $z = 0$ and $z = y + 3$.

Question 2

[**10 points**] Use spherical coordinates to calculate the volume of the solid bounded by the sphere $\rho = 4$ and below by the cone $\phi = \pi/3$.

Question 3

[**10 points**] Use Lagrange multiplier method to find the point(s) on the solid $x^2 + y^2 + z^2 = 1$, furthest from the point $P(2, 1, 2)$.

Question 4

[10 points] Evaluate the integral

$$\int_0^{1.5} \int_{x\sqrt{3}}^{\sqrt{9-x^2}} 2xy\,dy\,dx$$

using polar coordinates.

Question 5:

[10 points] Evaluate

$$\int_0^1 \int_0^y \frac{x}{y^2} \sin \frac{x}{y} dxdy.$$

Math 200 Sample Test 2 – Oct 2011

Question 1 : For the relationship $x^{-1} + y^{-1} + z^{-1} = 3$ compute $\frac{\partial^2 z}{\partial x^2}$.

Question 2: Let $z = xy + f(x^2 + y^2)$. Prove(or disprove) that $y\frac{\partial z}{\partial x} - x\frac{\partial z}{\partial y} = y^2 - x^2$.

Question 3: Sketch the domain of $f(x, y) = \sqrt{x^2 - y - 1}$.

Question 4 : Let $f(x, y, z) = ye^{x+z} + ze^{y-x}$. At the point $P(2, 2, -2)$, find the unit vector pointing in the direction of most rapid increase of f.

Question 5 : Let $f(x, y) = y^2 e^{xy} + \frac{x}{y}$. Find f_{xx}, f_{yy} *and* f_{xy}.

Question 6 : Find all relative extreme of $f(x, y) = xy(2x + 4y + 1)$.

Question 7 : Let $f_x = g_y$ and $g_x = -f_y$. Prove that $f(x, y)$ satisfies the Laplace equation, that is $f_{xx} + f_{yy} = 0$.

Question 8: Find the shortest distance between two lines

$$L_1 : x = 2 + 4t, y = -1 - 7t, z = -1 + t \textit{ and } L_2 : x = 2 - 2s, y = 1 + s, z = 2 - 3s.$$

Math 200 Sample Test 1 – Sep 2011

Question 1:

Given the line $x-1=y-2=z-3$ and the point $P(8,4,5)$. Find the equation of the plane which contains the line and the point.

(b) Find an equation of the set of all points equidistant from the points $A(7,-8,-9)$ and $B(-4,2,-10)$.

Question 2
Let if $|\overrightarrow{u}| = 9$, $|\overrightarrow{v}| = 3$ and $\widehat{\overrightarrow{u}, \overrightarrow{v}} = 45°$. Compute $|(\overrightarrow{u} + \overrightarrow{v}) \times (\overrightarrow{u} - \overrightarrow{v})|$.

Question 3 Identify and sketch the surfaces

(a)

$$z = x^2 - 2x + y^2$$

(b)

$$x - y^2 + 2 = 0.$$

Question 4

Use vectors $\overrightarrow{a} = \langle 2, -2, 1\rangle$ $\overrightarrow{b} = \langle 0, -1, 1\rangle$ and $\overrightarrow{c} = \langle 1, -1, 0\rangle$, to prove (disprove)

$$(\overrightarrow{a} \times \overrightarrow{b}) \times \overrightarrow{c} = (\overrightarrow{b} \cdot \overrightarrow{a})\overrightarrow{c} - (\overrightarrow{c} \cdot \overrightarrow{a})\overrightarrow{b}.$$

Question 5

Given the lines

$$L_1 : x = 1 + 2t, y = 1 - t, z = 1 + 2t \textit{ and } L_2 : x = 2 + s, y = 2 + s, z = 3 + 2s.$$

Find an equation of the plane containing both lines.

Question 6:

Find the line of intersection of two planes $x - 2y + 4z = 7$ and $x + y + 5z = 1$.

Question 7

Prove (disprove) that

$$|\overrightarrow{a} + \overrightarrow{b}|^2 - |\overrightarrow{b} - \overrightarrow{a}|^2 = 4\overrightarrow{a} \cdot \overrightarrow{b}$$

Question 7 Let $\overrightarrow{a} = \langle 2, 2, 2 \rangle$ $\overrightarrow{b} = \langle 5, \alpha, 5 \rangle$. (i) Find α such that $\overrightarrow{a}$ is orthogonal to $\overrightarrow{b}$. (ii) Find α such that $\overrightarrow{a} \times \overrightarrow{b} = \overrightarrow{b} \times \overrightarrow{a}$.