NDU

MAT 224

Calculus IV

Exam #2

Thursday May 29, 2014

Duration: 60 minutes

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Section:

Grade:

Problem Number	Points	Score
1	40	
2	13	
3	18	1
4	32	7
Total	103	

1) (40 points) For each of the following multiple-choice questions, circle the letter of the correct answer. If more than one letter is circled in the same problem, you will receive no credit for that proble m.

Question A (8 points) Using the method of Lagrange Multipliers to find the point closest to the origin on the curve of intersection of the plane x + y + z = 1 and the cone $z^2 = 2x^2 + 2y^2$, can vield the system of equations:

a)
$$2x = \lambda + 4\mu\alpha$$

$$2y = x + 4 \iota y$$
$$2z = x$$

$$x+y+z-1=0$$

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

b)
$$2x = 4\mu\alpha$$

$$2y = 4\mu y$$

$$2z = \hat{x}$$

$$2z = \hat{x}$$

$$x + y + z - 1 = 0$$

$$2z = \hat{x}$$

$$x + y + z - 1 = 0$$

c)
$$2x = \lambda + 4\mu\alpha$$

$$2y = x + 4\iota \varphi$$

$$2z = \hat{x} - 2\mu e \qquad 2z = \hat{x} - 2\mu e$$

$$x + y + z = 0 \qquad x + y + z - 1 = 0$$

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

d)
$$2x = \lambda + 4\mu\alpha$$

$$2y = \lambda + 4 \iota \varphi$$

$$2z = \lambda - 2\mu e$$

$$x + y + z - 1 = 0$$

$$2x^{2} + 2y^{2} - z^{2} = 0$$
 $2x^{2} + 2y^{2} - z^{2} = 0$ $2x^{2} + 2y^{2} = 0$ $2x^{2} + 2y^{2} - z^{2} = 0$

e) If none of the above is correct, circle (e) and write your answer here:

Question B (8 points)

$$\int_{0}^{9} \int_{\sqrt{y}}^{3} 3 \sec^{2}(x^{3}) dx dy =$$

- a) tan(27)
- **b)** tan(8)
- c) tan(1)
- d) 0
- e) If none of the above is correct, circle (e) and write your answer here:

Ouestion C (8 points)

Let R be the region in the first quadrant of the xy-plane that lies outside the circle $x^2 + y^2 = 1$ and inside the circle $x^2 + y^2 = 9$. Then $\iint (x + y) dx dy =$

- d) 0
- e) If none of the above is correct, circle (e) and write your answer here:

Question D (16 points) Consider the region D in space that is bounded from below by the xyplane, from above by the paraboloid $z = x^2 + y^2$ and laterally by the cylinder $x^2 + y^2 = 4$. Then a
triple integral, in cylindrical coordinates, representing the volume of D is:

Part 1 According to the order of integration dzdrd8

a)
$$\iint_{0}^{2} \iint_{0}^{2} r dz dr d\theta$$

$$\mathbf{b}) \int_{0}^{2\pi} \int_{0}^{2x^2+y^2} r dz dr d\theta$$

c)
$$\iiint_{0}^{2\pi^{2}r^{2}} rdzdrd\theta$$

d)
$$\iint_{0}^{4} \int_{0}^{4} r^{4} r dz dr d\theta$$

e) If none of the above is correct, circle (e) and write your answer here:

Part 2 According to the order of integration drdzd8

a)
$$\iint_{0}^{2\pi} \iint_{0}^{4\sqrt{z}} r dr dz d\theta$$

$$\mathbf{b}) \int_{0}^{2\pi^4} \int_{0}^{2} r dr dz d\theta$$

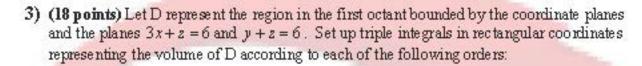
c)
$$\iint_{0}^{2\pi^2} \iint_{0}^{4} r dr dz d\theta$$

d)
$$\iint_{0}^{2\pi r^{1}} \int_{0}^{2} r dr dz d\theta$$

e) If none of the above is correct, circle (e) and write your answer here:

- 2) (13 points) Let R be the region in the first quadrant bounded by the curves y = 0 and $(x-2)^2 + y^2 = 4$, with $0 \le x \le 2$.
 - a) (3 points) Draw the region R in the xy-plane.

b) (10 points) Set up a double integral in polar coordinates using the order of integration $drd\theta$ equal to $\iint_S f(x,y) dA$, where $f(x,y) = x^4 + y^3$.



a) (8 points) dy dxdz

b) (10 points) dzdydx

- 4) (32 points) Let D be the solid region in space bounded from below by the plane z = 3 and from above by the sphere $x^2 + y^2 + (z 2)^2 = 4$.
 - a) (4 points) Draw the region D.

b) (5 points) Rewrite each of the above equations using spherical coordinates.

c) (10 points)) Set up triple integrals in spherical coordinates for the volume of D using the order of integration $d\rho d\phi d\theta$.

d) (13 points)) Set up triple integrals in spherical coordinates for the volume of D using the order of integration dedpd8.