MAT 397 CAL III Section M005 Spring 2016

TEST 3

Your Name (please PRINT): ______________________________

Student ID Number: ______________________________

INSTRUCTIONS

- Fill in the above items.
- There is a total of 5 problems, for a maximum possible total value of 100 points. **Make sure you have all 6 test pages (this cover page + 5 test pages)**. You are responsible to check that your test booklet has all 6 pages. Alert a proctor if your copy is missing any pages.
- **Show all your work.** Only minimal credit will be given for answers without supporting work.
- **Write your answer in the box** at the bottom of pages 2-6.
- **Use the back of test pages if additional space is needed**, and for scratch paper.
- **No calculators or other electronic devices; no outside notes; no outside tables** are allowed on this exam. Any use of calculators or electronic devices, or outside notes is a violation of the Academic Integrity Policy.

Do not write below this line

Pb. #	Max Points	Your Score
1	20	
2	20	
3	20	
4	20	
5	20	
Total	100	

1. (20 pts) Evaluate $\iiint_E y\,dV$, where E is the tetrahedron with vertices $(1,0,0)$, $(0,1,0)$, $(0,0,1)$ and $(0,0,0)$.

Answer:

2. (20 pts) $\iint_R x^3 e^{y^3}\, dA = \int_0^3 \int_{x^2}^9 x^3 e^{y^3}\, dy dx$

(a) Sketch the region R.

(b) Evaluate the integral by first reversing the order of integration.

Answer for part (b):

3. (20 pts) Find the volume between the two paraboloids $z = x^2 + y^2$ and $z = 8 - x^2 - y^2$.

Answer:

4. (20 pts) The solid E is bounded by two surfaces $\mathcal{S}_1 : \ \rho = 2\cos\phi$ and $\mathcal{S}_2 : \ \rho = 2$ and for both $\mathcal{S}_1$ and $\mathcal{S}_2$ we have $\phi \in [0, \ \frac{\pi}{2}]$.

(a) Specify the shape and position of these two surfaces $\mathcal{S}_1$ and $\mathcal{S}_2$.

(b) Suppose that the density of this solid E is $\rho(x, y, z) = z$. Find the mass of E.

(c) Set up the triple integrals for finding the center of mass of E. You do not need to evaluate the integrals.

Answer for part (a):
Answer for part (b):
Answer for part (c):

5. (20 pts) Use the given transformation $x = 3u\cos v$ and $y = 2u\sin v$ to evaluate the integral $\iint_R \sqrt{\frac{x^2}{9} + \frac{y^2}{4}}\, dA$, where R is enclosed by the ellipse $4x^2 + 9y^2 = 36$. (Note that these are not polar coordinates.)

Answer: