Math 2401
Spring 2015
Practice Exam 4
...
Time Limit: ... .

Name : _____

GT Id : _____

TA: _____

This exam contains 2 pages (including this cover page) and 5 problems. Check to see if any pages are missing. Enter all requested information on the top of this page, and put your initials on the top of every page, in case the pages become separated. Also, sign the Honor Code pledge at the bottom of this page, and follow the instructions below.

- You may **not** use your books, notes, or any calculator on this exam.

- **Show all your work.** A correct answer not supported by calculations and/or explanation will receive no credit. An incorrect answer supported by substantially correct calculations and explanation may receive partial credit.

- **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.

- If you need more space, use the back of the pages; clearly indicate when you have done so.

Problem	Points	Score
1	0	
2	0	
3	0	
4	0	
5	0	
Total:	0	

Honor Code Pledge: By signing below, you are verifying that you understand and uphold the Georgia Tech honor code.

Signature: _____

1. Evaluate the following integrals.

   (a) $\displaystyle \int_0^3 \int_{\sqrt{x/3}}^1 e^{y^3} \, dy \, dx$

   (b) $\displaystyle \int_1^{\sqrt{2}} \int_{\sqrt{2-x^2}}^x 5 \, dy \, dx.$

2. (a) Sketch the region of integration and convert to an equivalent Cartesian integral (Do not evaluate):

   $$\int_{\pi/6}^{\pi/2} \int_{\csc\theta}^2 r \, dr \, d\theta.$$

   (b) Find the area of the region R that lies inside the cardioid $r = 1 + \cos\theta$ and outside the circle $r = 1$.

3. Sketch the region R in the xy-plane enclosed by the the lines $x + 2y = 4$, $y = -1$ and the $y-$axis.

   (a) Set up a double integral in **Cartesian coordinates** for the area of the region R. (Do not evaluate.)

   (b) Set up a triple integral in **cartesian coordinates** for the volume of the solid that is bounded above by the surface $z = 25 + x^2 + y^2$ and below by the region R in the $xy-$plane.(Do not evaluate.)

4. Let D be the region bounded below by the cone $z = \sqrt{3(x^2 + y^2)}$ and above by the sphere $x^2 + y^2 + z^2 = 4$. Set up iterated triple integrals for the volume of D in Cartesian, cylindrical and spherical coordinates, and compute it using one of these integrals.

5. (a) Sketch the region of integration (R) for $\displaystyle \int_0^4 \int_{\frac{y}{2}}^{\frac{y}{2}+1} \frac{2x - y}{2} \, dx \, dy.$

   (b) Find the region G in the $uv-$ plane that maps to R under the transformation $x = u + v$, $y = 2v$.

   (c) Find the Jacobian of the above transformation.

   (d) Evaluate the integral given in part (a).