Math 241 Exam 3 Spring 2017 **Justin ∇∇yss-Gallifent**

Directions: Do not simplify, evaluate or integrate unless indicated. No calculators are permitted. Show all work as appropriate for the methods taught in this course. Partial credit will be given for any work, words, pictures or ideas which are relevant to the problem.

Please put problem 1 on answer sheet 1

1. (a) Evaluate the following integral. This is the only integral you need to evaluate: [8 pts]

$$\int_0^{\pi/2} \int_0^{\sin\theta} r\cos\theta \; dr \; d\theta$$

(b) Reparametrize the following integral as vertically simple but do not evaluate: [12 pts]

$$\int_0^{2} \int_0^{y^2} xy \; dx \; dy$$

Please put problem 2 on answer sheet 2

2. (a) Let R be the region inside the cardioid $r = 1 + \cos\theta$ and outside the circle $r = \frac{1}{2}$. Set up the iterated double integral in polar coordinates for $\iint_R y \; dA$. Do not evaluate. [15 pts]

(b) Let R be the region in the third quadrant and above the line $y = -x - 2$. Write down the iterated integral in polar coordinates for $\iint_R y \; dA$. Do not evaluate. [10 pts]

Please put problem 3 on answer sheet 3

3. Let D be the region inside the cylinder $(x-2)^2 + y^2 = 4$ and between the planes $z = 1$ and $z = 10 - x$. Write down the iterated triple integral in cylindrical coordinates for the volume of D. Do Not Evaluate. [15 pts]

Please put problem 4 on answer sheet 4

4. Let D be the solid under the cone $z = \sqrt{x^2 + y^2}$, between the cylinders $x^2 + y^2 = 1$ and $x^2 + y^2 = 4$ and above the xy-plane. If the density of D is given by $f(x, y, z) = z$, write down the iterated triple integral in spherical coordinate for the mass of D. Do not evaluate. [15 pts]

Please put problem 5 on answer sheet 5

5. Let R be the region bounded by the lines $y = \frac{1}{2}x + 1$, $y = \frac{1}{2}x + 3$, $y = 5 - x$ and $y = 2 - x$. Perform a change of variables to rewrite $\iint_R xy \; dA$ as an integral over a rectangle in the uv-plane and then parametrize to get an iterated integral. Do not evaluate. [25 pts]

The End