Math 241 Exam 3 Fall 2018 **Justin Wyss-Gallifent**

Directions: Do not simplify 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 or ideas which are relevant to the problem.

Please put problem 1 on answer sheet 1

1. Let R be the region bounded by $y = x^2$ and $y = 3x$. Evaluate the following integral. This is the only integral you need to evaluate. You do not need to simplify. [20 pts]

$$\int\int_R x\,dA$$

Please put problem 2 on answer sheet 2

2. Let R be the region inside the circle $r = \frac{3}{2}$ and outside the cardioid $r = 1 + \cos\theta$. Write down the double integral in polar coordinates for $\int\int_R x + y\,dA$. Do not evaluate. [20 pts]

Please put problem 3 on answer sheet 3

3. (a) Reparametrize the following integral as horizontally simple but do not evaluate. [10 pts]

$$\int_0^2 \int_0^{3x} x\,dy\,dx$$

   (b) Write down a parametrization of the half-cylinder $x^2 + y^2 = 4$ between $z = 1$ and $z = 5$ with $y \geq 0$. [10 pts]

Please put problem 4 on answer sheet 4

4. Let D be the solid in the first octant below the graph of $z = 9 - \sqrt{x^2 + y^2}$. Suppose the density at a point is given by $f(x, y, z) = xy$. Do not evaluate any of the following.

   (a) Write down the iterated integral in cylindrical coordinates for the mass of D. [10 pts]

   (b) Write down the iterated integral in spherical coordinates for the mass of D. [10 pts]

Please put problem 5 on answer sheet 5

5. Let R be the solid in the first quadrant bounded by the graphs of $y = \frac{1}{x}$, $y = \frac{3}{x}$, $y = \frac{1}{2}x$ and $y = 4x$. Use a change of variables to convert the integral $\int\int_R x\,dA$ into a double integral over a rectangular region. Do not evaluate. [20 pts]

The End and the TA Section List

Avi	0311 $\leftrightarrow$ 10:00	0321 $\leftrightarrow$ 11:00
Zeynep	0312 $\leftrightarrow$ 10:00	0322 $\leftrightarrow$ 11:00
Jialin	0331 $\leftrightarrow$ 12:00	0341 $\leftrightarrow$ 1:00
Zack	0332 $\leftrightarrow$ 12:00	0342 $\leftrightarrow$ 1:00