Math 241 Exam 3 Fall 2019 **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 the lines $y = x$, $y = 12 - 2x$ and $x = 0$. Evaluate and simplify the integral $\iint_R x\,dA$. [20 pts]
   This is the only integral you need to evaluate/simplify!

Please put problem 2 on answer sheet 2

2. (a) Let R be the region inside $r = 2\cos\theta$ and outside $r = 1$. Write down an iterated double integral in polar coordinates for $\iint_R \frac{y}{x}\,dA$. **Do not evaluate.** [10 pts]

   (b) Let D be the solid inside the cylinder $r = \sin\theta$, above the xy-plane, and below the paraboloid $z = 100 - x^2 - y^2$. Set up an iterated triple integral in cylindrical coordinates for $\iiint_D z\,dV$. **Do not evaluate.** [10 pts]

Please put problem 3 on answer sheet 3

3. (a) Reparametrize the following polar iterated integral as a vertically simple iterated integral. **Do not evaluate.** [10 pts]

$$\int_{\pi/4}^{\pi/2} \int_0^2 r\cos\theta\, r\,dr\,d\theta$$

   (b) Let D be the solid below the cone $z = \sqrt{x^2 + y^2}$, above the xy-plane, and inside the cylinder $x^2 + y^2 = 4$. Write down an iterated triple integral in spherical coordinates for $\iiint_D x\,dV$. **Do not evaluate.** [10 pts]

Please put problem 4 on answer sheet 4

4. (a) Let Σ be the portion of the plane $y + z = 9$ inside the cylinder $x^2 + z^2 = 9$, Write down a parametrization of Σ. [5 pts]

   (b) Let D be the solid bounded by the planes $y = x$, $y = 2x$, $y = 6$, $z = 0$ and $z = 10$. Set up the iterated triple integral in rectangular coordinates for $\iiint_D z^2\,dV$. Horizontally simple is best. **Do not evaluate.** [15 pts]

Please put problem 5 on answer sheet 5

5. Let R be the region in the first quadrant bounded by the functions $y = \frac{1}{x}$, $y = \frac{5}{x}$, $y = \frac{1}{4}x$, and $y = 3x$. Use a change of variables to convert the integral [20 pts]

$$\iint_R y^2\,dA$$

   into an iterated double integral over a rectangular region. **Do not evaluate.**

The End and the TA Section List

Stephen S.	0311 $\Leftrightarrow$ 10:00	0321 $\Leftrightarrow$ 11:00
Ke	0312 $\Leftrightarrow$ 10:00	0322 $\Leftrightarrow$ 11:00
S. Gilles	0331 $\Leftrightarrow$ 12:00	0341 $\Leftrightarrow$ 1:00
Chenzhi	0332 $\Leftrightarrow$ 12:00	0342 $\Leftrightarrow$ 1:00