Math 241 Extravagant Exam 3 Fall 2015 **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. (a) Let D be the solid inside both $z = 9 - \sqrt{x^2 + y^2}$ and $x^2 + y^2 = 4$ and with $z \geq 0$. Set up an iterated double integral in polar coordinates for the volume of D. Do not evaluate. [8 pts]

   (b) Let D be the solid in the first octant and below $x + 2y + z = 10$. Set up an iterated triple integral in rectangular coordinates for $\iiint_D xy \, dV$. Do not evaluate. [12 pts]

Please put problem 2 on answer sheet 2

2. (a) Let R be the region bounded by the axes and the line $2x + y = 10$. Set up an iterated double integral for $\iint_R y \, dA$ as a horizontally simple region. Do not evaluate. [8 pts]

   (b) Let R be the region inside $(x-1)^2 + y^2 = 1$ and to the right of $x = \frac{1}{2}$. Set up an iterated double integral in polar coordinates for $\iint_R x - y \, dA$. Do not evaluate. [12 pts]

Please put problem 3 on answer sheet 3

3. (a) Write down a parametrization of the part of the plane $3x + y + z = 10$ inside the cylinder $x^2 + z^2 = 4$. [8 pts]

   (b) Let D be the solid inside $z = \sqrt{3x^2 + 3y^2}$, outside $x^2 + y^2 + z^2 = 4$ and below $z = 5$. Set up an iterated triple integral in spherical coordinates for $\iiint_D z \, dV$. Do not evaluate. [12 pts]

Please put problem 4 on answer sheet 4

4. Perform a change to polar coordinates and evaluate [20 pts]

$$\int_0^{\sqrt{2}/2} \int_x^{\sqrt{1-x^2}} e^{(x^2+y^2)} \, dy \, dx$$

Please put problem 5 on answer sheet 5

5. Perform a change of variables which changes the integral $\iint_R x \, dA$ to an iterated double integral over a rectangle in the uv-plane. Here R is the region bounded by the lines $y - x = 0$, $y - x = 2$, $3x + y = 0$ and $3x + y = 4$. Make sure that all your steps are clear and draw both your regions R and S. Your final answer should be an iterated integral. Do not evaluate. [20 pts]

TAs are:

Maxx (0311=10:00, 0321=11:00)
Danul (0312=10:00, 0342=1:00)
Daniel (0322=11:00, 0332=12:00)
Douglas (0331=12:00, 0341=1:00)

The End