MA 351, Fall 2008 **Project 3** Name:

Due on Wednesday, December 3

Resources:

- The websites and PDF documents listed on MATLAB Info website (link found on Blackboard and class website).
- As usual, the files found in the H-drive. TIP: save these to your own drive and change/experiment with them to learn how some of the commands work.

Instructions: Complete the problems listed on the back on your own sheet(s) of paper. Be as neat and clear as possible – **points will be awarded for not only accuracy but overall neatness**. **You may not ask other students for help on these problems, although you may ask for my help.**

TO TURN IN:

1. This sheet, on top and stapled to the hand-written work for each of the problems (turned in at the beginning of class), written neatly.
2. The script file that generates the answer and graph for #3, emailed to me with the subject line "MA351 PROJECT 3"

POINT SYSTEM:
The project is out of a total of 15 points. Each problem is worth 5 points. ONLY EXACT VALUES WILL BE ACCEPTED.

_____/ 5 points Problem 1

_____/ 5 points Problem 2

_____/ 5 points Problem 3

For the MATLAB in #3, points will be awarded not only for accuracy of the set-up and computation of the integral, but also:

- File is sent appropriately (with correct filename, filetype, etc.)
- Script file is commented and runs correctly to generate the graph without extraneous output in the command window. The first line of the script file should be a comment with your name, Project 3 and the problem.
- Graph has appropriate domains, title and the axes are appropriately labeled.
- In using MATLAB to calculate the integral, output is sent to the command window that is clear what the final answer is.

NOTE: only one of the following problems requires the use of MATLAB.

1. Do ONE of §15.5: #10, 16, 28, or 32, showing all work. Sketch the region(s) involved for our work.

2. Do ONE of §15.6: #38 or #50, showing all work. Sketch the region(s) involved for your work (you can sketch 2D regions if you make clear what you are sketching).

3. §15.8, #43* (problem changed slightly). Use $m = 6$ and $n = 7$ instead. This problem will use MATLAB to graph the solid AND to calculate the integral.

   (a) To graph the solid, see the Basic Plotting Commands page found through the MATLAB page linked on Blackboard and the class website to find out how to graph the "tumor" using spherical coordinates and then converting to rectangular coordinates.

   (b) Write on paper what the integral would be to compute the volume of the solid. Then, use MATLAB to calculuate the EXACT VALUE of the volume of the solid and write your answer that you got from MATLAB (convert MATLAB output to what we would normally write). This can be done using the Symbolic Math Toolbox in MATLAB. For example, to compute the following double integral,

   $$\int_0^{2\pi} \int_0^2 (4 - r^2) r^2 \, dr \, d\theta,$$

   one can do it in MATLAB like this:

   ```
   syms r theta
   insideintegral=int((4-r^2)*r^2,r,0,2)
   finalintegral=int(insideintegral,theta, 0,2*pi)
   ```

   For another example, to compute

   $$\int_0^1 \int_0^{1-x} \int_0^{1-x-y} z \, dz \, dy \, dx,$$

   one can do it in MATLAB like this:

   ```
   syms x y z
   int1=int(z, z, 0, 1 - x - y)
   int2=int(int1,y,0,1-x)
   int3=int(int2,x,0,1)
   ```

   Save your script file that created the graph AND the commands to compute the integral as `Proj3_3Lastname.m`. YOU DO NOT NEED TO SEND ME THE JPG FILE OF THE GRAPH - THE SCRIPT FILE THAT GENERATES THE GRAPH IS SUFFICIENT.

EXTRA CREDIT (5 POINTS): §15.6, #34. Draw the 2D regions that are the projections onto the different planes that help to change the order of the iterated integral. (Like Figures 9, 10 and 13 in the text.)