MATH 251:H4–H6
Maple assignment 5
FALL 2015

You are encouraged to discuss this assignment with other students and with your instructors, but the work you hand in should be your own. The web page

http://www.math.rutgers.edu/courses/251/Maple/Lab5/CenterGravity.html

can help you with this assignment; to find it, follow the "Maple in Math 251" link on the the Math 251 course webpage.

A website will be posted listing individual data for each student. For this lab, the data will information about a region in the plane, and information about a region in space:

- The region in the plane will be defined by its boundary curves. Both curves will be of the form $y = f(x)$. One curve will be a straight line, and one curve will be the graph of a fourth degree polynomial. The area of the region will also be given.

- The region in space will consist of those points which are both inside a sphere centered at the origin and above the graph of a circular paraboloid. The volume of this region will also be given. A density function, a polynomial possibly involving x and y and z, will be given.

Use `Maple` to present the plots asked for below and to help you answer the questions.

Display the region in the plane graphically. Assume the region in the plane has constant density. Where is the center of gravity (centroid) of the region? Along the way, verify the value given for the area of the region.

Display the region in space graphically. Verify the value given for the volume of the region. Using the given mass density, find the total mass of the material filling the region. Note that the sphere and the paraboloid both have cylindrical symmetry (and note that Maple will plot surfaces in cylindrical coordinates).

This assignment is due **December 17**. Late submissions will *not* be accepted.

Please hand in a printout of all Maple instructions that you use.

- All pages should be labeled with your name and section number. Also, please *staple* together all the pages you hand in.

- **You should clean up your submission by removing the instructions that had errors.**

The work that you hand in should include:

1. A clear picture of the region in the plane, and a computation of the intersection points of the curves which define it.

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2. Computations of the area of the region (verifying the given information) and the total moments about each coordinate axis. A computation of the center of gravity of the region. You should label the total moments and the center of gravity.

3. A clear picture of the region in space, and an appropriate specification of the intersection points of the two surfaces defining the boundary.

4. A computation of the volume of the region.

5. A computation of the total mass in the region using the given density distribution, via via a triple integral or integrals.