

The due date for this lab will be provided by your lecturer or recitation instructor. Late submissions will not be accepted.

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

For helpful background material, see the web page

<https://sites.math.rutgers.edu/courses/251/Maple/Lab5/CenterGravity.html>

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.

Instructions

- **Use Maple to:**
 - 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).
 - **Hand in a printout of your work. In this printout:**
 - Label all pages with your name and section number. Also, please *staple together* all the pages you hand in.
 - *Clean up your submission by removing the instructions that had errors.*
 - **Include in the work that you hand in:**
 - A clear picture of the region in the plane, and a computation of the intersection points of the curves which define it.
 - 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.
 - A clear picture of the region in space, and an appropriate specification of the intersection points of the two surfaces defining the boundary.
 - A computation of the volume of the region.
 - A computation of the total mass in the region using the given density distribution, via a triple integral or integrals.
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