Mathematica Project 3: due December 1st
Multivariate Calculus, MTH 212, Fall 2023

Note: Late projects will not be accepted.

Failure to follow directions below may result in lost points.

Use the text input mode to start your Mathematica notebook with your name and project number. Your project should be well-organized and clear to read; make sure all the exercises are clearly labeled (use comment or text mode) and all questions answered. Once the project is completed, review it and submit it to the appropriate folder at `http://LIVE.wilkes.edu` at anytime before 11:59 pm on 12/01/23. *The name of your .nb file should identify you clearly.* (A good example of a name could be John_Smith_Project3.nb.) Before submitting, **delete all output from your notebook** - you can find the corresponding command under "Cell" in your notebook top panel.

1. Working with the solid E bounded by $z = 0$, $z = 5y$ and $x^2 = 36 - y$, use Mathematica to:

   (a) graph the solid E (you can use either *ContourPlot3D* or *RegionPlot3D* or both);

   (b) set up and evaluate all six triple integrals in Cartesian coordinates using different order of integration each time to find the volume of E. (Make sure you get the same value every time!)

2. Find the centroid[1] of the solid between the sphere $\rho = \cos\phi$ and the hemisphere $\rho = 2$, $z \geq 0$. (You can find the picture of the solid in Exercise 55 on page 830 in your textbook.) Use Mathematica to do all the computations (you need integrals for the first moments and the mass (do not forget to use the symmetry), and graph the surfaces bounding the region using *SphericalPlot3D*, together with the centroid (make it big enough to be seen - you can graph it as a small ball using *Graphics3D*). Use "Opacity" option to make the surfaces transparent enough so that the centroid can be seen.

[1]Recall: for constant density functions, the center of mass is the centroid of the object. Set the density function δ equal to 1.