

Math 13, Multivariable Calculus

Written Homework 2

- 15.4:22. Use polar coordinates to find the volume of the solid inside the sphere $x^2 + y^2 + z^2 = 16$ and outside the cylinder $x^2 + y^2 = 4$.
- 15.5:20. Consider a square fan blade with sides of length 2 and the lower left corner placed at the origin. If the density of the blade is $\rho(x, y) = 1 + 0.1x$, is it more difficult to rotate the blade about the x -axis or the y -axis?
- 15.5:8. Find the mass and center of mass of the lamina that occupies the region bounded by $y = x^2$ and $y = x + 2$, with density function $\rho(x, y) = kx$, $k \neq 0$.
- 15.7:16. Evaluate the triple integral $\iiint_T xyz \, dV$, where T is the solid tetrahedron with vertices $(0, 0, 0)$, $(1, 0, 0)$, $(1, 1, 0)$, $(1, 0, 1)$.
- 15.7:28 Sketch the solid whose volume is given by the following iterated integral, and compute the value of that volume:

$$\int_0^2 \int_0^{2-y} \int_0^{4-y^2} dx \, dz \, dy.$$

- 15.8:24. Find the volume of the solid that lies between the paraboloid $z = x^2 + y^2$ and the sphere $x^2 + y^2 + z^2 = 2$.