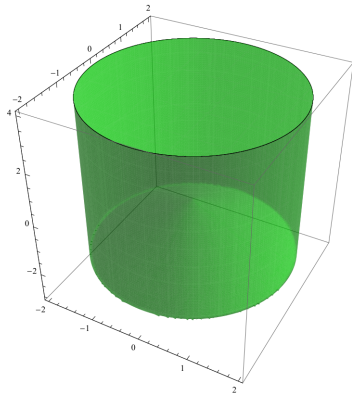
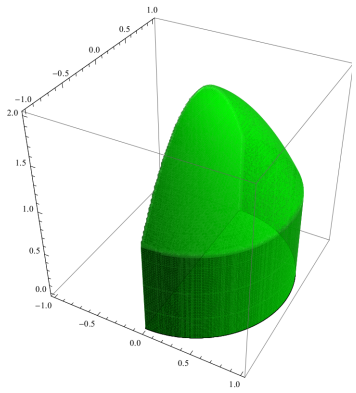
Name:_____

§13.5 Triple Integrals in Cylindrical and Sherical Coordinates

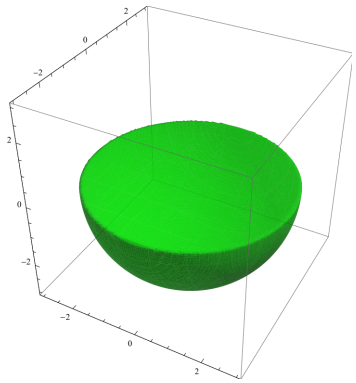
1. Set up the triple integral $\iiint_Q f(x,y,z)\,dV$ in cylindrical coordinates, where Q is the region above $z = -\sqrt{x^2+y^2}$ and inside $x^2+y^2=4$.



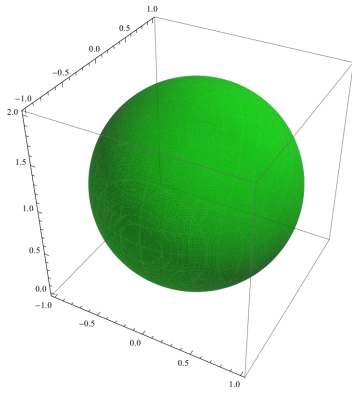
2. Change the coordinate system and evaluate the iterated integral
$\displaystyle\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_0^{2-x^2-y^2} \sqrt{x^2+y^2}\,dz\,dy\,dx.$



3. Set up and evaluate the triple integral in an appropriate coordinate system: $\iiint_Q \sqrt{x^2+y^2+z^2}\,dV$, where Q is bounded by the hemisphere $z=-\sqrt{9-x^2-y^2}$ and the xy-plane.

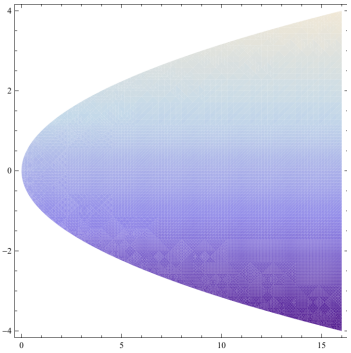


4. Change the coordinate system and evaluate the iterated integral
$$\int_{-1}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}}\int_{1-\sqrt{1-x^2-y^2}}^{1+\sqrt{1-x^2-y^2}} \left(x^2+y^2+z^2\right)^{3/2}\,dz\,dy\,dx.$$

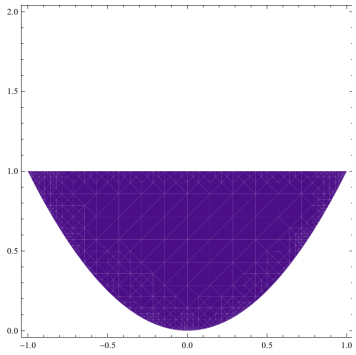


§13.6 Integrals for Mass Calculations

5. Find the mass and center of mass of the lamina bounded by $x = y^2$ and $x = 16$ with density $\rho(x, y) = y + 7$.



6. Find the mass and moments of inertia M_x and M_y for a lamina in the shape of the region bounded by $y = x^2$ and $y = 1$ with density $\rho(x, y) = 5$.

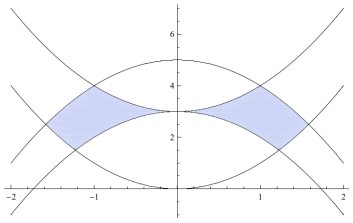


7. Find the mass of the solid in the region bounded by $z = 4 - x^2 - y^2$ and $z = 0$, with density $\rho(x, y, z) = 5e^{-(x^2+y^2)}$.

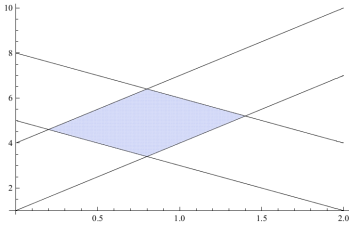
8. Find the mass of the solid tetrahedra bounded by $x + y + 8z = 8$ and the coordinate planes, with density $\rho(x, y, z) = x + 8y$.

§13.7 Change of Variables in Multiple Integrals

9. Find a transformation from a rectangular region S in the uv-plane to the region R in the xy-plane, where R is bounded by $y = x^2$, $y = x^2 + 3$, $y = 5 - x^2$, and $y = 3 - x^2$.



10. Evaluate the double integral $\iint_R 2x - y\,dA$, where R is bounded by $y = 3x + 1$, $y = 3x + 4$, $y = -2x + 5$, and $y = -2x + 8$.



11. Find the Jacobian determinant of the given transformation: $T: x = 6u\cos(v), y = 7u\sin(v)$.

12. Find the volume of the solid Q, where Q is bounded by $x+3z = -2$, $x+3z = 0$, $3y-5z = -2$, $3y - 5z = 1$, $3y - 2z = 1$, and $3y - 2z = 2$.