

### Tutorial Worksheet

Show all your work.

1. Let  $E$  be the region between the spheres  $x^2 + y^2 + z^2 = z$  and  $x^2 + y^2 + z^2 = 2z$ . Set up, but do not calculate, the integral  $\iiint_E (x^2 + y^2) dV$ .

**2.** Set up, but do not solve, the integral that gives the volume of the solid region bounded by the paraboloid  $z = 3y^2 + 3x^2$  and the cone  $z = 4 - \sqrt{x^2 + y^2}$ .

**3.** Let  $D$  be the quarter of the disc centered at the origin with radius  $a$  with  $x \geq 0$  and  $y \geq 0$ . Suppose that the density at a point on  $D$  is proportional to the square of its distance from the origin. Find the center of mass of  $D$ . (Hint:  $\bar{x} = \bar{y}$  by symmetry.)

4. Use a triple integral to compute the volume of the tetrahedron bounded by the planes  $x = 0$ ,  $y = 0$ ,  $z = 0$ , and  $2x + y + z = 4$ .