

## CYLINDRICAL INTEGRALS

For each problem below, set up and evaluate a triple integral in cylindrical coordinates.

1. Use a triple integral in cylindrical coordinates to find the volume of a cylinder of height  $H$  and radius  $R$ .
2. Let  $V$  be a sphere with center at the origin and radius  $= R$ . Find the volume of  $V$ .
3. Find the volume of the solid bounded by the sphere  $x^2 + y^2 + z^2 = 1$  and the cone  $z = \sqrt{x^2 + y^2}$ .
4. Find the volume of the solid bounded above by  $z = -x^2 - y^2 + 2$  and below by the  $xy$ -plane.
5. Find the volume of the solid bounded above by  $z = -x^2 - y^2 + 1$  and below by  $z = x^2 + y^2 - 1$ .
6. Suppose you have a bead of radius 3 mm, and you drill a hole of radius 1 mm through the center. Find the volume that remains.