(1) This exercise will show how to use spherical coördinates to solve #14.6.17: compute the volume below the surface with equation $x^2 + y^2 + z^2 = 80$ and above the surface with equation $z = \dfrac{1}{2}(x^2 + y^2)$.

    (a) Convert $x^2 + y^2 + z^2 = 80$ to spherical coördinates, and use the result to find one limit for ρ.

    (b) Convert $z = \dfrac{1}{2}(x^2 + y^2)$ to spherical coördinates, and use the result to find another limit for ρ.

    (c) Remember that the circle of intersection of the surfaces is a circle of radius 4, centred on the z-axis, at height $z = 8$. What is the ϕ-coördinate of this circle?

    (d) Use (a)–(c) to set up an integral that will express the desired volume.

    (e) Compute your integral from (d).

• **Fifteen** book problems: #11.7.26, 89–94, 109, 111; #14.3.23, 28; #14.7.10, 11, 14, 19.