

MAT135H1S Calculus I(A)
Solution to even-numbered problem in Section 3.9

(Section 3.9, Q6)

Let V be the volume of the sphere in mm^3 , and r be the radius of the sphere in mm. We are given $\frac{dr}{dt} = 4$, and we want to find $\frac{dV}{dt}$ when the diameter is 80 mm, or in other words, when the radius is 40 mm.

The volume of a sphere is given by

$$V = \frac{4}{3}\pi r^3.$$

Differentiating with respect to t , we obtain

$$\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}.$$

Substituting $\frac{dr}{dt} = 4$ and $r = 40$, we obtain

$$\frac{dV}{dt} = 4\pi(40)^2(4) = 25600\pi.$$