ISARA-Lyon
Maths 1A
(P46)

TD n°5
Correction exercice 2

1°) $V(R, h) = \pi R^2 h + \frac{2}{3}\pi R^3$.

2°) $\boxed{dV = \left(\frac{\partial V}{\partial R}\right)_h dR + \left(\frac{\partial V}{\partial h}\right)_R dh}$.

- $\left(\frac{\partial V}{\partial R}\right)_h = 2\pi R h + 2\pi R^2$
  $= 2\pi R(h + R)$
- $\left(\frac{\partial V}{\partial h}\right)_R = \pi R^2$

donc :

$dV = 2\pi R(h+R)\,dR + \pi R^2\,dh$.

3°) $\boxed{\frac{dV}{dt} = 2\pi R(h+R)\frac{dR}{dt} + \pi R^2 \frac{dh}{dt}}$.

4°) A.N : $\begin{cases} \frac{dR}{dt} = 1 \text{ cm/min} \\ \frac{dh}{dt} = 2 \text{ cm/min} \end{cases}$

$$\frac{dV}{dt} = 2\pi \times 10 \times 30 \times 1 + \pi \times 100 \times 2$$
$$= 600\pi + 200\pi$$
$$= 800\pi \text{ cm}^3.\text{min}^{-1}$$
$$= \frac{80\cancel{0}\pi}{6\cancel{0}}$$
$$= \frac{40\pi}{3} \text{ cm}^3.\text{s}^{-1}.$$