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1   p461, #29, §1 Asked

Given: A circular cylinder of varying radius r and height h. At a given time, $r = 6$ inch, $\dot{r} = 0.2$ in/sec, $h = 8$ in, $\dot{h} = -0.4$ in/sec.

Asked: $\dot{V}$ and $\dot{A}$ at that time.

2   p461, #29, §2 Solution

$$V = \pi r^2 h \qquad A = 2\pi rh + 2\pi r^2$$

$$\mathrm{d}V = \frac{\partial V}{\partial h}\,\mathrm{d}h + \frac{\partial V}{\partial r}\,\mathrm{d}r$$

$$\dot{V} = \pi r^2 \dot{h} + \pi 2 r h \dot{r} = 15.08 \text{ in}^3/\text{sec}$$

$$\dot{A} = 2\pi r \dot{h} + (2\pi h + 4\pi r)\,\dot{r} = 10.05 \text{ in}^2/\text{sec}$$