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

\[ V = \pi r^2 h \quad A = 2\pi rh + 2\pi r^2 \]

\[ dV = \frac{\partial V}{\partial h} \, dh + \frac{\partial V}{\partial r} \, dr \]

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

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