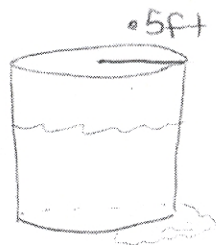


Practice Problems with Related Rates

P267 13, 25

EX Water is leaking out of a cylindrical tank, whose base is a circle of radius .5 ft, at the rate of .1 cubic feet per minute. Find dh/dt



$$V = \pi r^2 h = \pi \cdot 0.25 h$$

$$\frac{dV}{dt} = 0.25 \pi \frac{dh}{dt}$$

$$\frac{dV}{dt} = \text{Rate In} - \text{Rate Out} = -0.1 \text{ ft}^3/\text{min}$$

$$\frac{-0.1 \text{ ft}^3/\text{min}}{0.25 \text{ ft}^2 \pi} = \frac{dh}{dt}$$

$$\boxed{-\frac{2}{5\pi} \text{ ft}/\text{min} = \frac{dh}{dt}}$$

Ex. Chemicals are pumped into a cylindrical mixing tank at the rate of $2 \text{ ft}^3/\text{min}$. If the mixture leaves the tank at 1 cubic foot per minute, find the rate the chemicals are rising in a tank with a radius of 5 ft.



$$V = \pi r^2 h$$

$$V = 25\pi h$$

$$\frac{dV}{dt} = 25\pi \frac{dh}{dt}$$

$$\begin{aligned} \frac{dV}{dt} &= \text{Rate in} - \text{Rate out} \\ &= 2 \text{ ft}^3/\text{min} - 1 \text{ ft}^3/\text{min} = 1 \text{ ft}^3/\text{min} \end{aligned}$$

$$\boxed{\frac{1 \frac{\text{ft}}{\text{min}}}{25\pi} = \frac{dh}{dt}}$$

* Try this problem with $\frac{dh}{dt}$ as a known value and Rate in as unknown *