RR HW Day 1

1. $\frac{dr}{dt} = 3 \text{ cm/min}$

Find $\frac{dA}{dt}$ when a) $r = 6$ cm b) $r = 24$ cm

$A = \pi r^2$

$\frac{dA}{dt} = \pi \cdot 2r \frac{dr}{dt}$

a) $\frac{dA}{dt} = \pi \cdot 2(6)(3) = 36\pi \text{ cm}^2/\text{min}$

b) $\frac{dA}{dt} = \pi \cdot 2(24)(3) = 144\pi \text{ cm}^2/\text{min}$

2 $\frac{dr}{dt} = 2 \text{ in/min}$

Find $\frac{dV}{dt}$ when $r = 6$ in and $r = 24$ in

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

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

$\frac{dV}{dt} = 4\pi(6)^2(2) = 288\pi \text{ in}^3/\text{min}$

$\frac{dV}{dt} = 4\pi(24)^2(2) = 4608\pi \text{ in}^3/\text{min}$

3. $\frac{dV}{dt} = 800 \text{ cm}^3/\text{min}$

Find $\frac{dr}{dt}$ when a) $r = 30$ cm b) $r = 60$ cm

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

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

a) $\frac{dr}{dt} = \frac{800}{4\pi(30)^2} = \frac{2}{9\pi} \text{ cm/min}$ b) $\frac{dr}{dt} = \frac{800}{4\pi(60)^2} = \frac{1}{18\pi} \text{ cm/min}$

4. $V = \frac{1}{3}\pi r^2 h$

Find $\frac{dV}{dt}$ if $\frac{dr}{dt} = 2\ in/min$, $h = 3r$ and

a) $r = 6\ in$ b) $r = 24\ in$

$V = \frac{1}{3}\pi r^2(3r) = \pi r^3$

$\frac{dV}{dt} = \pi \cdot 3r^2 \cdot \frac{dr}{dt}$

a) $\frac{dV}{dt} = \pi \cdot 3(6)^2(2) = 216\pi\ in^3/min$

b) $\frac{dV}{dt} = \pi \cdot 3(24)^2(2) = 3456\pi\ in^3/min$

5. $V = \frac{1}{3}\pi r^2 h$ $\frac{dV}{dt} = 10\ ft^3/min$ $d = 3h$

$2r = 3h$

Find $\frac{dh}{dt}$ when $h = 15\ ft$. $r = \frac{3h}{2}$

$V = \frac{1}{3}\pi\left(\frac{3h}{2}\right)^2 h = \frac{3}{4}\pi h^3$

$\frac{dV}{dt} = \frac{3}{4}\pi \cdot 3h^2 \cdot \frac{dh}{dt}$

$10 = \frac{3}{4}\pi \cdot 3(15)^2 \cdot \frac{dh}{dt}$

$10 = \frac{2025}{4}\pi \frac{dh}{dt}$

$\frac{8}{405\pi}\ ft/min = \frac{dh}{dt}$