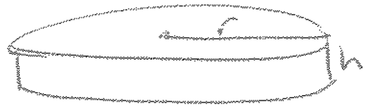
2.8 (Math 1210)

#8 $\frac{dV}{dt} = -4 \text{ ft}^3/\text{hr}$




right, circular cylinder

$\frac{dh}{dt} = -0.0005 \text{ ft/hr}$

$\frac{dA}{dt} = ?$ when $h = 0.001$ ft & $r = 250$ ft

$\Rightarrow A = \pi r^2 = \pi(250^2) = 62500\pi$

$V = Ah$ (need product rule to differentiate)

$$\frac{dV}{dt} = A\frac{dh}{dt} + h\frac{dA}{dt}$$

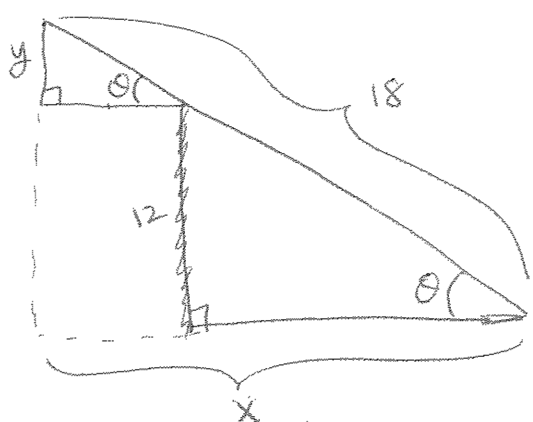
$$-4 = 62500\pi(-0.0005) + 0.001\frac{dA}{dt}$$

$$31.25\pi - 4 = 0.001\frac{dA}{dt}$$

$$\boxed{31250\pi - 4000 \text{ ft/hr} = \frac{dA}{dt}}$$

$$\frac{dA}{dt} \simeq 94174.77 \text{ ft/hr}$$

#27




$(12+y)^2 + x^2 = 18^2$

(differentiate implicitly wrt $t$)

$\frac{dx}{dt} = 2 \text{ ft/sec}$ $\frac{dy}{dt} = ?$

when $\theta = 60°$

$$2(12+y)\frac{dy}{dt} + 2x\frac{dx}{dt} = 0$$

$$\frac{dy}{dt} = \frac{-x}{12+y}\frac{dx}{dt}$$

if $\theta = 60°$, have


$\cos 60° = \frac{x}{18} \Rightarrow x = 18(\frac{1}{2}) = 9$

and $\sin 60° = \frac{y+12}{18} \Rightarrow y = 18(\frac{\sqrt{3}}{2}) - 12 = 9\sqrt{3} - 12$

$$\frac{dy}{dt} = \frac{-9}{12 + (9\sqrt{3} - 12)}(2)$$

$$= \frac{-18}{9\sqrt{3}} = \frac{-2}{\sqrt{3}} = \frac{-2\sqrt{3}}{3} \text{ ft/sec}$$