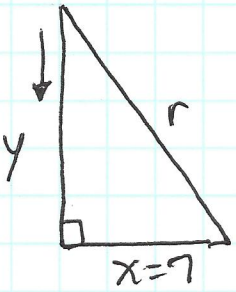
§6.4 DAY 72 HW. p. 237-242 #18, 33, 35, 38.

(18)



$x^2+y^2=r^2$

$7^2+10^2=r^2$

$r=\sqrt{149}$

$A=\frac{1}{2}(7)(y)$

$\frac{dA}{dt}=\frac{7}{2}\frac{dy}{dt}$

$y=10$

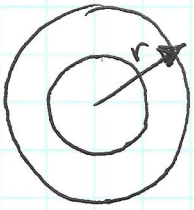
y decreasing at $2\frac{cm}{sec}$ $\therefore \frac{dy}{dt}<0$ $\rightarrow \frac{dy}{dt}=-2\frac{cm}{sec}$

$\frac{dA}{dt}=\frac{7}{2}(-2)$

$\frac{dA}{dt}=-7\frac{cm^2}{sec}$

ATQ: The area of a triangle w/ one leg 7cm is decreasing at a rate of $7\ cm^2/sec$ the moment the other leg is 10 cm.

(33)



$r=150$ meters.

$\frac{dr}{dt}=+0.1\frac{m}{min}$

thickness of slick $=0.02$ meters $=h$

a) $A=\pi r^2$

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

$\frac{dA}{dt}=2\pi(150)(0.1)$

$\frac{dA}{dt}=30\pi\frac{m^2}{min}$

ATQ: At the moment the radius is 150 m. the area of the oil slick is increasing at a rate of $30\pi\frac{m^2}{min}$.

b) $V=\pi r^2 h$ $\quad \frac{dV}{dt}=0$

$\frac{dV}{dt}=\pi\left(2rh\frac{dr}{dt}+r^2\frac{dh}{dt}\right)$

$-\pi r^2\frac{dh}{dt}=2\pi rh\frac{dr}{dt}$

$\frac{dh}{dt}=\frac{2\pi rh}{-\pi r^2}\frac{dr}{dt}$

$\frac{dh}{dt}=-\frac{2h}{r}\frac{dr}{dt}$

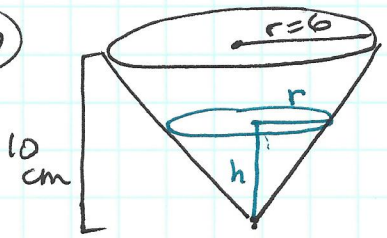
$\frac{dh}{dt}=\frac{(-2)(0.02)(0.1)}{150}$

$\frac{dh}{dt}=-0.000026666\overline{6}$

ATQ: The thickness of the oil slick is decreasing at a rate of $0.000026\overline{66}$ when the $r=150$ meters.

§6.4 DAY 73 HW. p. 237–242 # 35, 38

(35)



$\frac{dV}{dt} = -1.5 \frac{cm^3}{sec}$ negative b/c water is decreasing in the filter.

$= -\frac{3}{2} \frac{cm^3}{sec}$

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

$V = \frac{1}{3}\pi (6)^2 (10)$

$V = 60\pi \ cm^3$ when full.

$(r)(t) = \text{vol.}$

$\left(1.5 \frac{cm^3}{sec}\right)(t) = 60\pi \ cm^3$

$t = \frac{60\pi \ cm^3}{1.5 \ \frac{cm^3}{sec}}$

$\frac{60}{\left(\frac{3}{2}\right)} = 60 \cdot \frac{2}{3}$

$t = 40\pi$ sec

$t \approx 125.66370$ sec.

It takes 40π seconds for the water to drain from a full filter

b) $\frac{r}{6} = \frac{h}{10}$ use similar $\triangle$s.

$h = \frac{10(r)}{6} = \frac{5}{3} r$

$h = \frac{5}{3} r \longrightarrow r = \frac{3}{5} h$

$V = \frac{\pi}{3}(r^2)\left(\frac{5}{3} r\right)$

$V = \frac{5\pi}{9}(r^3)$ or

$V = \frac{\pi}{3}\left(\frac{3}{5} h\right)^2 h$

$V = \frac{9\pi}{75}(h^3)$

c) find $\frac{dh}{dt}$ when $h = 8$

$\frac{dV}{dt} = \frac{9\pi}{25} h^2 \frac{dh}{dt}$

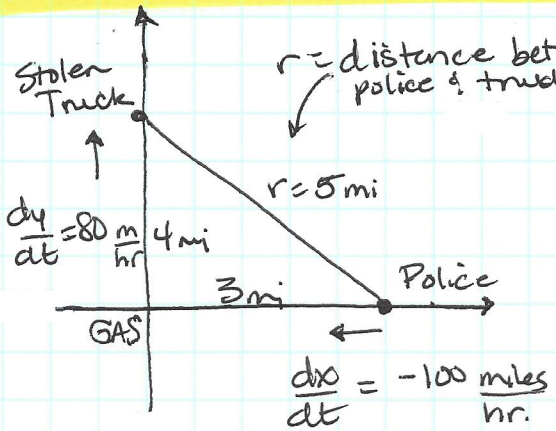
$\frac{dh}{dt} = \left(\frac{25}{9\pi h^2}\right)\left(\frac{dV}{dt}\right)$

$\frac{dh}{dt} = \left(\frac{25}{9\pi}\right)\left(\frac{1}{64}\right)\left(-\frac{3}{2}\right) = \frac{-25}{384\pi} = -0.02073 \ \frac{cm}{sec}$

The water level is falling at a rate of 0.0207

§6.4 DAY 7 p. 237–242 #38

(38)



a) $x^2 + y^2 = r^2$

$$x\frac{dx}{dt} + y\frac{dy}{dt} = r\frac{dr}{dt}$$

$$\left(\frac{1}{r}\right)\left(x\frac{dx}{dt} + y\frac{dy}{dt}\right) = \frac{dr}{dt}$$

$$\left(\frac{1}{5}\right)\left(3(-100) + 4(80)\right) = \frac{dr}{dt}$$

$$(2)(3(-10) + 4(8))$$

$$2(-30 + 32)$$

$$4\ \frac{m}{hr} = \frac{dr}{dt}$$

ATQ. The distance between the car & the truck is increasing at a rate of 4 miles/hr.

b) If truck is going 70 mph

$$\left(\frac{1}{5}\right)\left(3(-100) + 4(70)\right) = \frac{dr}{dt}$$

$$(2)(3(-10) + 4(7)) = \frac{dr}{dt}$$

$$2(-30 + 28) = \frac{dr}{dt}$$

$$2(-2) = \frac{dr}{dt} = -4\ \frac{m.}{hr}$$

ATQ: The distance between the truck & the car is decreasing at a rate of 4 miles/hr.