16 $\quad 2x^2+y^2=3 \qquad x=y^2$

$$2y^4+y^2-3=0 \longrightarrow y=-1 \text{ n } y=1$$

$\therefore (1,-1)$ and $(1,1)$

$$4x+2y\frac{dy}{dx}=0 \qquad 1=2y\frac{dy}{dx}$$

A $\quad \frac{dy}{dx}=-\frac{2x}{y}$ $\qquad$ B $\quad \frac{dy}{dx}=\frac{1}{2y}$

At $(1,-1)$

Ⓐ $\left.\frac{dy}{dx}\right|_{(1,-1)} = 2$

Ⓑ $\left.\frac{dy}{dx}\right|_{(1,-1)} = -\frac{1}{2}$

Since $(2)(-\frac{1}{2}) = -1$ the curves are othog at $(1,-1)$.

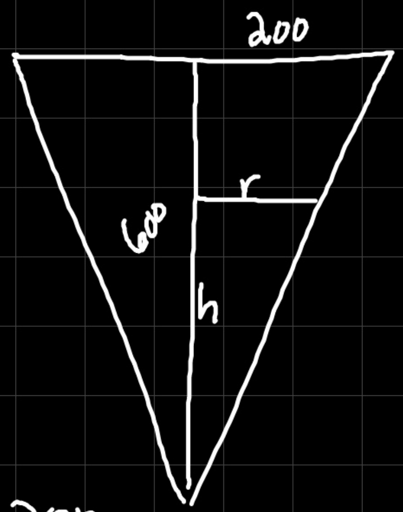
At $(1,1)$

Ⓐ $\left.\frac{dy}{dx}\right|_{(1,1)} = -2$

Ⓑ $\left.\frac{dy}{dx}\right|_{(1,1)} = \frac{1}{2}$

Since $(-2)(\frac{1}{2}) = -1$ the curves are orthog at $(1,1)$.

9



$$\frac{dV}{dt} = \underline{I - 10000}$$

$$\frac{dh}{dt} = 20 \quad \text{Find } I \text{ when } h = 200$$

$$\frac{6\cancel{00}}{h} = \frac{2\cancel{00}}{r}$$

$$6r = 2h$$

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

$$r^2 = \frac{h^2}{9}$$

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

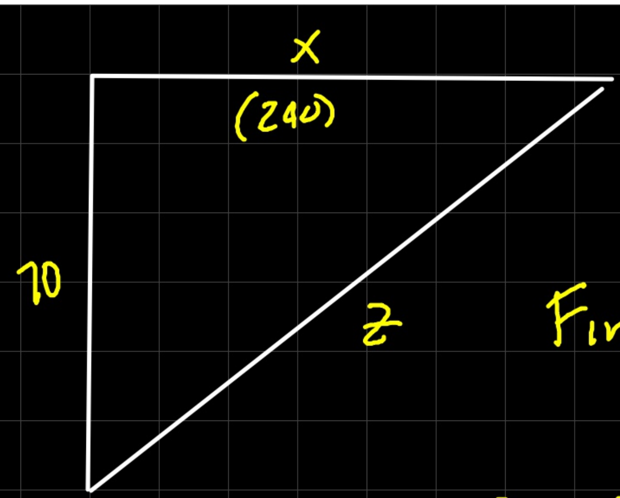
$$V = \frac{1}{3}\pi \frac{h^2}{9} h$$

$$V = \frac{\pi}{27} h^3$$

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

$$I - 10000 = \frac{\pi}{9}(200)^2(20)$$

1



$$\frac{dx}{dt} = 60$$

Find $\frac{dz}{dt}$ when $x = 240$
$z = 250$

$$z = \sqrt{240^2 + 70^2}$$
$$= 250$$

$$z^2 = x^2 + 70^2$$

$$\cancel{2}z\frac{dz}{dt} = \cancel{2}x\frac{dx}{dt}$$

$$250\frac{dz}{dt} = (240)(60)$$

$$\frac{dz}{dt} = 57.6$$

$\therefore$ 57.600 m/s.

(2) $\frac{dr}{dt} = -.1$

$A = \pi r^2$ $\qquad$ $C = 2\pi r$

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

$$= -.1C.$$

③ $\frac{dr}{dt} = .2$

$A = \pi r^2$

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

$\frac{dA}{dt} = 2\pi 10 (.2)$

$= 4\pi$

$C = 2\pi r$

$20\pi = 2\pi r$

$r = 10$

$\frac{dA}{dt} = 20\pi \; (.2)$

$= 4\pi$