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

Isect

$2y^4 + y^2 - 3 = 0 \longrightarrow y = 1$ or $y = -1$

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

A $\quad 4x + 2y\frac{dy}{dx} = 0$

$$\frac{dy}{dx} = -\frac{2x}{y}$$

B $\quad 1 = 2y\frac{dy}{dx}$

$$\frac{dy}{dx} = \frac{1}{2y}$$

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 curve are orthog 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 curve are othog at $(1,1)$.

(10) $r = \frac{h}{2}$ $\quad \frac{dV}{dt} = 30$ Find $\frac{dh}{dt}$ when $h = 10$

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

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

$$\boxed{V = \frac{\pi}{12} h^3}$$

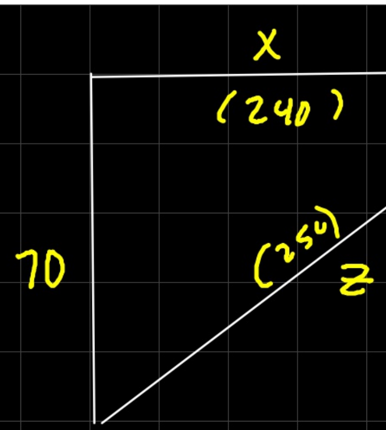
$$\frac{dV}{dt} = \frac{\pi}{4} h^2 \frac{dh}{dt}$$

$$30 = \frac{\pi}{4}\left(\cancel{100}^{25}\right)\frac{dh}{dt}$$

$$\frac{dh}{dt} = \frac{30}{25\pi} = \frac{6}{5\pi}$$

$\therefore \frac{6}{5\pi}$ ft/min.

1



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

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

$z = 250$

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

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

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

$$\frac{dz}{dt} = 57.600$$

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

$\therefore$ 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

$$\frac{dr}{dt} = .2$$

$$A = \pi r^2$$

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

$$= 2\pi(10)(.2)$$

$$= 4\pi$$

$$C = 2\pi r$$

$$\cancel{20\pi = 2\pi r \rightarrow r = 10}$$

$$\cancel{2\pi r \frac{dr}{dt} = 20\pi}$$

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