

Q.2 Find the Orth. Trajs. of lines?

$$y = Cx$$

$$C = \frac{y}{x}$$

$$\frac{dy}{dx} = C \Rightarrow \frac{dy}{dx} = \frac{y}{x}$$

To find orthogonal trajectories

$$\Rightarrow \frac{dy}{dx} = -\frac{x}{y} \quad \text{diff. eq. of first order first degree}$$

$$\Rightarrow \int y dy = -\int x dx$$

$$\Rightarrow \frac{1}{2} y^2 = -\frac{1}{2} x^2 + C$$

$$\Rightarrow y^2 + x^2 = 2C$$

~~$$\frac{y^2}{2C} + \frac{x^2}{2C} = 1$$~~

circle equation
with center $(0,0)$
and $r = \sqrt{2C}$