Q.2 Find Orth. trajs.
Family of Parabolas that vertices at (2,1) and focies at x-axis.

The Parabolas eq.

$$(y-k)^2 = 4c(x-h)$$

$$\Rightarrow (y-1)^2 = 4c(x-2)$$

$$\Rightarrow c = \frac{(y-1)^2}{4(x-2)}$$

$$2(y-1)y' = 4c$$

$$y' = \frac{4c}{2(y-1)}$$

$$y' = \frac{4\frac{(y-1)^2}{4(x-2)}}{2(y-1)} = \frac{(y-1)}{2(x-2)}$$

to find an orth. trajs.

$$y' = -\frac{2(x-2)}{(y-1)}$$ diff. eq. of first order first degree

$$\frac{dy}{dx} = \frac{-2(x-2)}{(y-1)} \Rightarrow \int (y-1)dy = -2\int (x-2)dx$$

$$\frac{1}{2}(y-1)^2 = -(x-2)^2 + a$$

$$(y-1) = \sqrt{-2(x-2)^2 + a}$$

$$(y-1)^2 = -2(x-2)^2 + a$$