1 Q3

$$M = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

Let the the point on given hyberbola be (t,1/t) in parametric form where t $\neq$ 0. In homogeneous coordinate system the point on the parabola will be of the form

$$X = \begin{bmatrix} t' \\ 1/t' \\ 1 \end{bmatrix}$$

Let the transformed homgeneous coordinate after applying the transformation matrix on hyperbola be

$$X' = \begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix}$$
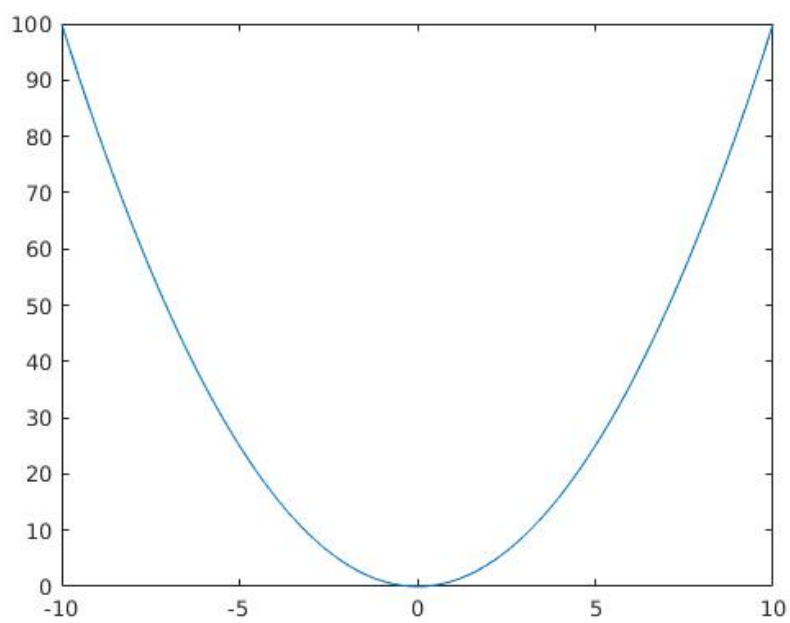
So we can write the relation as X' = MX

$$\begin{bmatrix} x' \\ y' \\ 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix} * \begin{bmatrix} t \\ 1/t \\ 1 \end{bmatrix}$$

From here we get

$$X' = \begin{bmatrix} 1 \\ 1/t \\ t \end{bmatrix}$$

Points of transformed image in Euclidian Geometry is $(1/t, 1/t^2)$ Now we can write the realtion in terms of x and y as $y = x^2$.This is equation of parabola except at t = 0 where it is not defined.

[H]

The transformed Image of hyperbola