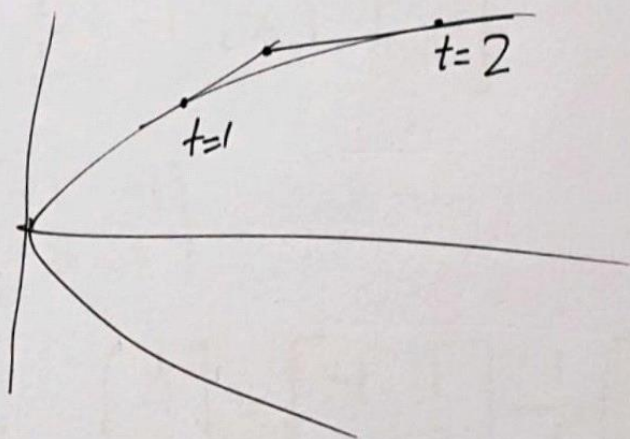


Parabola.

~~$y^2 = 4ax$~~ $y^2 = 4ax$ $x = at^2$ $y = 2at$

$$\frac{dy}{dx} = \frac{2a}{2at}$$
$$= \frac{1}{t}$$



~~$\frac{y-2a}{x-a} = 1$~~

~~$y-2a = x-a$~~

~~$y-x = a$~~

~~$\frac{y-4a}{x-4a} = \frac{1}{2}$~~

~~$2y-8a = x-4a$~~

~~$2y-x = 4a$~~

$$\frac{y-2at}{x-at^2} = \frac{1}{t}$$

$$\frac{y-4at}{x-4at^2} = \frac{1}{2t}$$

$$yt - 2at^2 = x - at^2$$

$$2yt - 8at^2 = x - 4at^2$$

$$yt - x = at^2$$

$$2yt - x = 4at^2$$

$$\begin{bmatrix} t & -1 \\ 2t & -1 \end{bmatrix} \begin{bmatrix} y \\ x \end{bmatrix} = \begin{bmatrix} at^2 \\ 4at^2 \end{bmatrix}$$

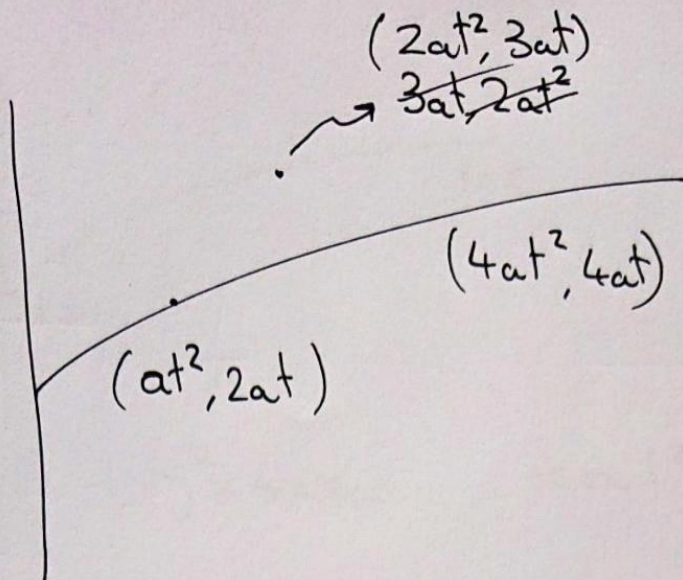
$$\frac{1}{-t+2t} \begin{bmatrix} -1 & +1 \\ -2t & t \end{bmatrix}$$

$$\begin{bmatrix} y \\ x \end{bmatrix} = \begin{bmatrix} -1 & 1 \\ -2t & t \end{bmatrix} \frac{1}{t} \begin{bmatrix} at^2 \\ 4at^2 \end{bmatrix}$$

$$\begin{bmatrix} y \\ x \end{bmatrix} = \begin{bmatrix} -1 & 1 \\ -2t & t \end{bmatrix} \begin{bmatrix} at \\ 4at \end{bmatrix}$$

$$= \begin{bmatrix} 4at - at \\ -2t^2a + 4at^2 \end{bmatrix}$$

$$= \begin{bmatrix} 3at \\ 2at^2 \end{bmatrix}$$



$$\text{num}[y]^2 = 4a \text{ num}(x) \text{ den}$$

$$x = at^2(1-u)^2 + 4uat^2(1-u)u + 4at^2u^2$$

$$y = 2at(1-u)^2 + 6uat(1-u)u^2 + 4at^2u^2$$

$$\text{den} = (1-u)^2 + 2u(1+u)u^2 + u^2$$

$$(1-u)^2u^2: \text{ LHS: } 36\omega^2a^2t^2 + 16at^2 = (36\omega^2 + 16)at^2$$

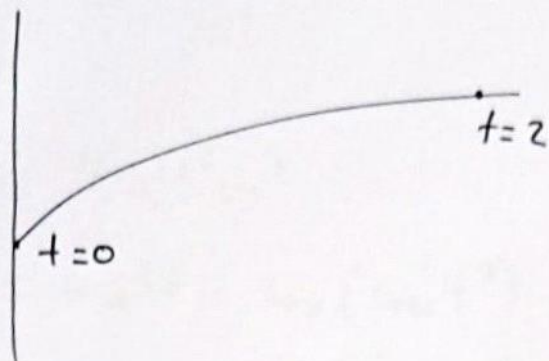
$$\text{RHS: } 4(8\omega^2a^2t^2 + 8at^2)$$

$$4(8\omega^2a^2t^2 + 4at^2 + at^2) = (32\omega^2 + 20)at^2$$

$$36\omega^2 + 16 = 32\omega^2 + 20$$

$$4\omega^2 = 4$$

$$\omega^2 = 1 //$$



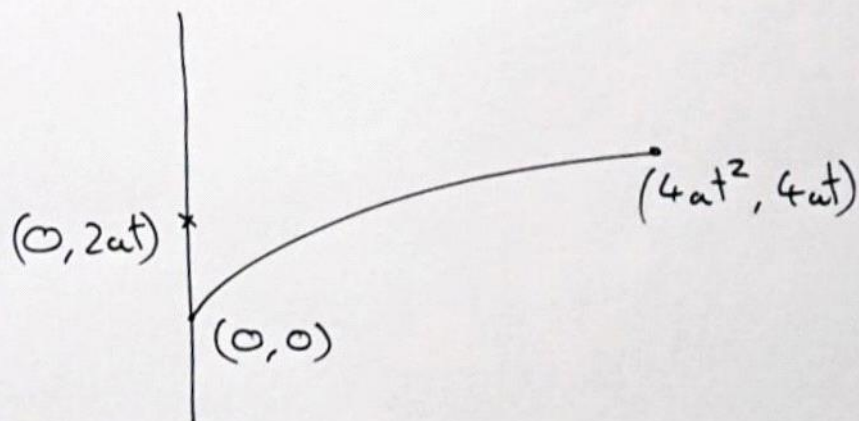
$$y^2 = 4ax, \quad x = at^2, \quad y = 2at.$$

$$\frac{y - 4at}{x - 4at^2} = \frac{1}{2t}$$

$$\frac{y - 4at}{0 - 4at^2} = \frac{1}{2t}$$

$$y - 4at = -2at$$

$$y = 2at$$



$$\therefore \text{num}(x) = 4at^2 u^2$$

$$\text{num}(y) = 4atu(1-u)u + 4atu^2$$

$$\text{den} = (1-u)^2 + 2wu(1-u) + u^2$$

$$\text{LHS: } 16a^2t^2\omega^2$$

$$\text{RHS: } \cancel{4a^2t} \quad 4a(4at^2)$$

$$16a^2t^2\omega^2 = 16a^2t^2$$

$$\omega^2 = 1$$