

PROBLEM I.

Let

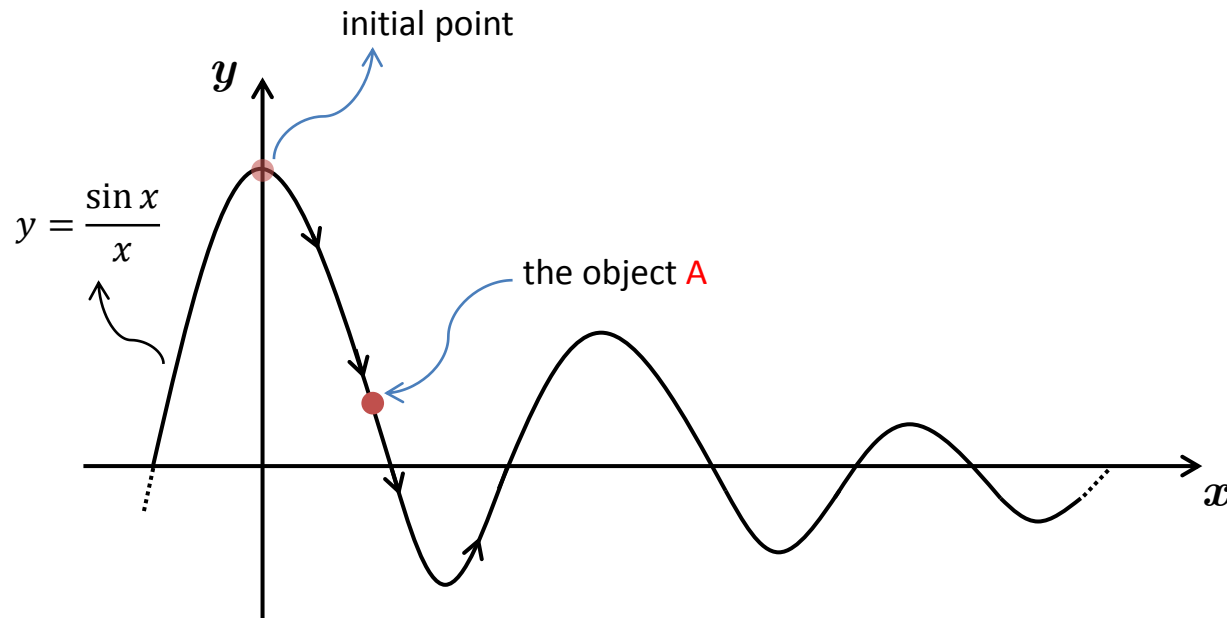
$$f(x) = \begin{cases} \frac{\sin x}{x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$$

1. Find $f'(x)$.
2. Prove that $f'(x)$ is a continuous function.

3. Suppose that an object A is moving along the curve

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

and that it started its motion at the point $(0,1)$ when $t=0$. If the projection (i.e., shadow) of A on the x -axis is moving from left to right at the rate of $5\pi/36$ units per second, find the speed of the object at the moment when $t=18$ seconds. [Hint: You may use the arc length function.]



PROBLEM II.

Sketch the curve $x^{2/3} + y^{2/3} = 1$ and use symmetry to find its length.