The question is a parameter estimation problem. The objective is to determine the values of unknown variables within a specific parametric equation of a curve.

The two models/equations are:

$$x = (t.\cos\theta - e^{M*|t|} * \sin(0.3 * t) * \sin\theta + X)$$

$$y = (42 + t.\sin\theta + e^{M*|t|} * \sin(0.3 * t) * \cos\theta)$$

with the parameters θ, M, X.

The data (x,y) for 1500 points are given in a file. As t lies between 6 and 60, it is uniformly sampled to get 1500 points, corresponding to (x,y).

As x and y share **two parameters(M, θ)** , optimizing parameters separately for x or y would yield inconsistent results that cannot describe a single coherent 2D curve. Therefore, the loss for x and y are computed separately and their **sum is minimized jointly** using the ADAM optimizer, which finds a single parameter set {θ, M, X} that simultaneously minimizes errors in both dimensions.