Assignment for Research and Development / AI

Basic Assignment Rules

Academic Integrity

- **No Cheating:** Students must complete all assignments independently unless group work is explicitly permitted. Using unauthorized materials, devices, or assistance during examinations or assignments is strictly prohibited.
- **No Copying or Plagiarism:** All work submitted must be original. Copying from other students, textbooks, websites, or any other sources without proper citation constitutes plagiarism and will result in serious consequences.

- **Proper Citation:** When referencing external sources, ideas, or quotes, students must provide appropriate citations following the required citation style (APA, MLA, Chicago, etc.).

Heading 3

Problem

Find the values of unknown variables in the given parametric equation of a curve :

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

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

unknowns are

$$\theta, M, X$$

Given range for unknown params is :

$$0\,\text{deg} < \theta < 50\,\text{deg}$$
$$-0.05 < M < 0.05$$
$$0 < X < 100$$

parameter ‘t’ has range:

$$6 < t < 60$$

Given is the list of points that lie on the curve for $6 < t < 60$:

xy_data.csv 27.4 KiB

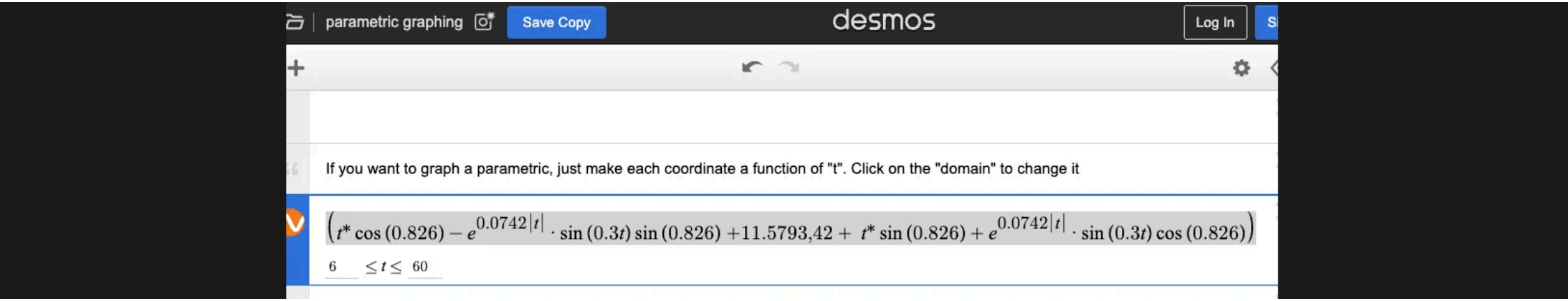
Assessment Criteria:

The candidates will be judged on following:

- The L1 distance between uniformly sampled points between expected and predicted curve (max score 100)
- Explanation on complete process and steps followed (max score 80)
- Submitted code / github repo (max score 50)
- *Note: Even if your answer is incorrect or incomplete, you will receive credit for explaining your thought process and approach.*

Submission Format

- For the following assignment the only required and necessary result is the value of **Unknown variables** , submission can be made by writing and copying equations in latex format or from the following website in the readme file of the submitted github repo: https://www.desmos.com/calculator/rfj91yrxob
- Example submission :
  "\left(t*\cos(0.826)-e^{0.0742\left|t\right|}\cdot\sin(0.3t)\sin(0.826)\ +11.5793,42+\
  t*\sin(0.826)+e^{0.0742\left|t\right|}\cdot\sin(0.3t)\cos(0.826)\right)"
  translates to :


parametric graphing
Save Copy
desmos
Log In
If you want to graph a parametric, just make each coordinate a function of "t". Click on the "domain" to change it
$\left(t^* \cos(0.826) - e^{0.0742|t|} \cdot \sin(0.3t) \sin(0.826) + 11.5793{,}42 + t^* \sin(0.826) + e^{0.0742|t|} \cdot \sin(0.3t) \cos(0.826)\right)$
$6 \leq t \leq 60$