The due date for this lab will be provided by your lecturer or recitation instructor. Late submissions will not be accepted.

You are encouraged to discuss this assignment with other students and with the instructors, but the work you hand in should be your own.

For helpful background material, see the web page
`https://sites.math.rutgers.edu/courses/251/Maple/Lab2/Curves.html`

The data for this lab will be a vector-valued function. The components of the vector function will be various combinations of sine and cosine, perhaps raised to (integer) powers. This could be the theoretical description of the "backbone" of a large molecule. This `Maple` lab asks you to investigate and report on the molecule. In order to help you check preliminary results, the message will also contain the curvature of the curve when the parameter, t, is 2. You will analyze your own curve and answer these questions:

How big is the curve? How long is the curve? Does the curve intersect itself? What is the largest curvature that this curve has? At what point does this largest curvature occur? Show this on a graph.

Precise computations of the quantities requested are almost always impossible. Therefore you will need to use numerical techniques, or will need to estimate by examining graphs. Your results will be approximations. This is good enough![1]

Instructions

- **Hand in a printout of your work. In this printout:**
  - Label all pages with your name and section number. Also, please *staple together* all the pages you hand in.
  - *Clean up your submission by removing the instructions that had errors.*
- **Include in the work that you hand in:**
  - A graph of the curve, clearly identified. If you need to, show several graphs of the curve which will help convince the reader that your curve does or does not have several self-intersections. Give your own conclusion about this.
  - Several graphs of the curve which allow you to identify a "box" in which the curve sits. The box should be of the form $x_{\min} \le x \le x_{\max}$, $y_{\min} \le y \le y_{\max}$, and $z_{\min} \le z \le z_{\max}$. You can indicate the dimensions "by hand" on your printout.
  - A computation of the length of your curve.
  - A computation of the curvature of the curve when $t = 2$. Show that this matches the information you were given. Graph the curvature of your curve as a function of the parameter, t. Indicate "by hand" on this graph the value of the parameter and the value of the curvature for the point on the curve which has the largest curvature.
  - A determination of the coordinates of the point on the curve which has the largest curvature. Identify this point with the greatest curvature on a graph of your curve. You may wish to show both a constrained and an unconstrained view.

[1] Although they are approximations, it is difficult to imagine getting even moderately accurate approximate answers for these questions in a reasonable amount of time without technology (a machine and programs).