Traveling Salesperson Project
Math 242
due Friday, May 10

Use simulated annealing to find an approximate solution to the Traveling Salesperson Problem (TSP). Put all your work in a new Colab notebook. Set things up so you can easily vary the number of points N. See how large you can make N and still find a good tour in reasonable amount of time.

Then implement at least one of the following extensions of the TSP:

1. Suppose north-south travel is more expensive than east-west travel. Modify your distance function so that the difference between y-values is multiplied by some constant c. You might think of this new function as a "cost" function rather than a distance function. This is now the function to minimize along the tour.

2. Suppose that the points lie on either side of a border, and crossing the border involves an additional cost. For example, you might let the line $y = 5$ be the border. If an edge crosses this line, then its "cost" equals its distance plus some constant c. The cost of traveling along an edge that doesn't cross the border is simply the distance along the edge. The cost function is now the function to minimize along the tour.

Your Report

Turn in a Colab notebook saved as a PDF file. To save your Colab notebook as a PDF file, go to File $\rightarrow$ Print, and choose destination "Save as PDF". Check your PDF file to make sure that your code and output appears properly. You may also submit the link to your Colab notebook via the text field in the Moodle assignment submission page.

As usual, submit code that runs and explain what your code does. Your goal should be to communicate your work to another person (e.g., another student at your level who is not in this course).

Grading Rubric

Your notebook will be graded on a scale of 0 to 16 points. The following rubric gives characteristics of notebooks that will merit sample point totals. (Interpolate the following for point totals that are not divisible by 4.)

16 points. Questions and goals are clearly stated, including relevant definitions or parameters. Computations are complete; code runs and is clearly explained. Conclusions are clearly stated and backed up by sufficient computational evidence. Limitations of the methodology, extensions for future work, and conjectures are discussed. Notebook is well-formatted and easy to read.

12 points. Questions and goals are stated well, though relevant definitions or parameters may be missing. Computations are mostly complete; code runs, but explanation is weak. Conclusions are unclear or not well justified. Insufficient discussion of limitations, extensions, and conjectures.

8 points. Statement of questions or goals is unclear. Computations are incomplete; explanation is ambiguous. Code may produce errors when run. Conclusions are possibly correct, but not justified. Little or no discussion of limitations, extensions, or conjectures. Notebook is difficult to read.

4 points. Serious misunderstanding of the questions or goals. Computation is inadequate for the task at hand. Work is not clearly explained. No discussion of limitations, extensions, or conjectures. Notebook is difficult to read.

0 points. Notebook is not turned in.