IE801B Homework Assignment 2

Write computer programs for solving the TSP that do the following tasks:

1. Generate a random symmetric TSP instance.
2. Solve the TSP instance as an integer programming problem with all subtour elimination constraints using either Gurobi or CPLEX.
3. Solve the TSP instance as an integer programming problem with subtour elimination constraints added as lazy constraints using either Gurobi or CPLEX. If you are using Python or Julia, visualize how subtours are eliminated and save the images as a GIF animation file to show progress; `matplotlib` and `Plots.jl` can save GIF animations. If you are using Java or C++, the visualization part is optional.
4. Solve the TSP instance using the Concorde TSP Solver. For Python, use `pyconcorde`; for Julia, use `Concorde.jl`; for C/C++, compile the Concorde source code; for Java, optional.

By increasing the problem size gradually, report the computational time.
Submit the following files for this assignment:

1. A PDF report that summarizes your code, experiments, and findings. LaTeX is recommended but not required. Using a Jupyter notebook is fine. Describe your experimental settings: CPU, RAM, OS, language version, package version, computational time, etc. In most cases, this is the only file that I will read. I will read your source code if necessary.
2. Describe how you used AI tools. This is not for grading but for my own education on how students are using AI tools.
3. GIF animation.
4. Your code files.
   - Do NOT submit your algorithm code as a Jupyter Notebook. You can use Jupyter while developing your code but not in the submission. (But for submission your Jupyter needs to be converted to PDF.)
   - You can write your main code as `main.py` and import it to your Jupyter notebook to create the final report is fine.
   - In your report, specify which source file is the file that I need to run to reproduce the results. If you choose to use C/C++/Java, describe how I can compile and run the code. For C/C++, `cmake` is recommended.
5. Please upload each file (PDF and source codes) separately without zipping unless you have too many separate files or use special directory structures.

6. If you prefer to submit your code via GitHub repo, that is okay too. You need to mention the repo URL and the specific commit SHA. Please make sure that I have access to the repo. My GitHub account name is `chkwon`.