***Read all of the following information before starting the project:***

*Permitted on project*:

* Open book, open notes, open Python documentation, open internet (Google, etc.).
* You are **encouraged** to copy/modify your existing code from homework 1-10, exams 1-3, and Dr. Smay’s solutions as necessary. All new additions to the code should be your own work.
* You are permitted to work in teams of three (or four with permission).

*Not permitted on project*:

* You **MAY NOT** use any form of technology to communicate with, send to, or receive information from another person (other than the instructor, TA or partner), during the project.

*Project submission*:

* You should create a private github repository called **Project2024** to house all your files. Submit a link to your repository in Canvas.
* You may include scans/pictures of your hand-written notes to augment your work on the problems. This is especially helpful when deciding partial credit on programs that don’t work fully.

*Grading*:

* A working program that satisfies all the requirements of the problem is easy to grade and receives full credit.
* A partially working program or non-functioning program likely deserves much partial credit, but this depends on your commenting in the code and/or submitting hand-written notes about your work.

1. (75 points) This is a collective class effort and depends on all of you to participate. On CANVAS, there is a link for Course Evaluations (SSI). If 90% of the class completes the SSI prior to the due date, you will all receive 75% of the credit on the project. If less than 90% complete the SSI, I will prorate the score.
2. (25 points) You have access to a Rankine cycle program that has two turbines. This program allows us to explore the Rankine cycle with varying P\_High, P\_Mid and P\_Low, the inlet conditions to the both turbines, and the turbine efficienciencies in SI or English units. The program has been written in the MVC pattern.

Your job is to find the optimum reheat for a second turbine. This means that you may choose an intermediate pressure between P\_High and P\_Low, where the discharge of turbine 1 is reheated and then passed through turbine 2 to exit at P\_Low. Of course both turbine 1 and turbine 2 have isentropic efficiencies. Your optimization routine should be focused on maximizing cycle efficiency by selecting the value of P\_Mid and T\_Mid. T\_Mid needs to be limited to reasonable temperatures as does the inlet temperature for turbine 1. I recommend exploring the operating conditions for real Rankine power cycles and looking at the temperature limits.

To do list:

1. Modify the GUI to include T\_Mid maximum line edit and incorporate this into the rankine controller as all other widgets have been.
2. Modify the optimize function of the controller to include proper penalty functions if the optimizer goes out of range for P\_Mid or T\_Mid and include T\_Mid as a variable to be optimized in our call to optimize.
3. After optimization, update the View to reflect the optimal P\_Mid and T\_Mid