ENGR 102 – Fall 2022
Lab: Topic 10 (team)
Assigned 10/31 Due 11/7

Deliverables:
There is only one deliverable for this team assignment. Please submit the following file to zyBooks:

- `debugged_code.py` `10.13 10pts = 50 points on Canvas`

Activity #1: Debugging code – team
Open the Excel file thermo_properties.xlsx. This document lists thermodynamic properties of liquid water at varying temperatures and at two different pressures. The properties listed are as follows:

- Specific volume (v) in units of $\frac{m^3}{kg}$
- Specific internal energy (u) in units of kJ/kg
- Specific enthalpy (h) in units of kJ/kg
- Specific entropy (s) in units of $kJ/(kg \cdot K)$

It is common to use linear interpolation for temperature values not listed. So, for properties at $T = 25$ ℃, you need to interpolate between the property values listed for $T = 20$ ℃ and $T = 40$ ℃. It is also common to interpolate between pressure values as well. When both temperature and pressure values are not listed, it is necessary to perform a double interpolation. Check out the double interpolation example video posted on Canvas for an explanation of the math.

Open the file buggy_code.py. In this file, the temperature and property values for $P = 5\ MPa$ and $P = 10\ MPa$ have been hard-coded **as lists** for temperatures from $T = 0$ ℃ to $T = 260$ ℃. The program takes as input a temperature and pressure from the user, finds the two values of temperature that bracket the user's value, then performs a double linear interpolation for all four properties. The results are formatted and printed to the screen using 7, 2, 2, and 4 decimal places for the specific volume, specific internal energy, specific enthalpy, and specific entropy, respectively.

At least, that's what this program is *supposed* to do. Instead, the file you are given has several bugs! As a team, find and fix all of them. Rename the file debugged_code.py for submission to zyBooks. When debugging, remember DRIFT: discover, reproduce, isolate, fix, and test. It's a good idea to come up with several test cases to test your code before you start making changes.

Example output (using input **50**, **7.5**):

```
Enter a temperature between 0 and 260 deg C: 50
Enter a pressure between 5 and 10 MPa: 7.5
Properties at 50.0 deg C and 7.5 MPa are:
Specific volume (m^3/kg): 0.0010092
Specific internal energy (kJ/kg): 208.24
Specific enthalpy (kJ/kg): 215.81
Specific entropy (kJ/kgK): 0.6984
```