AME 20231
Homework 3
Due: Thursday, 1 February 2024, 9:00 AM, on `CANVAS`

1. 2.49, instead let the tank volume be 405 m^3.
2. 2.62, instead let the final temperature be 390 K.
3. 2.91, show details for all calculations; do not just report software output.
4. 2.98, Perform two sets of calculations for this problem: a) ideal gas equation of state, b) tabular equation of state, Table B.3.
5. (adopted from BS, 7th edition) Saturated pressure as a function of temperature follows a correlation obtained by Wagner to find

$$\ln P_r = \frac{w_1\tau + w_2\tau^{1.5} + w_3\tau^3 + w_4\tau^6}{T_r},$$

where the reduced pressure and temperature are $P_r = P/P_c$ and $T_r = T/T_c$, where c denotes the critical point. The term τ is defined as

$$\tau = 1 - T_r.$$

The parameters for R134-a are

$$w_1 = -7.59884, \quad w_2 = 1.48886, \quad w_3 = -3.79873, \quad w_4 = 1.81379.$$

Compare this correlation to the results found in the table in Appendix B.

Make your comparison in the form of a plot of P versus T. Use appropriate SI units for pressure and temperature, and label your plot appropriately. Your plot should have a continuous curve for the predictions of Wagner's equation; do not use circles or stars, etc., to label any individual points. The data from the tables should be labeled by a discrete marker such as a little circle or star. The data from the table should not have any curve connecting its points on your graph; just put in the raw data points. Examine plots on linear and semi-log, and log scales, and choose to present the one that gives the best depiction of the information.