Compute and plot the compressibility factor (y) verses pressure (x) for the (1) Van der Waal’s (2) Redlich-Kwong and (3) Peng-Robinson equations of state.

Compressibility Factor, ; where is the specific volume ().

Data for n-Butane:

T = 500 K; Tc = 425.2 K; Pc = 37.5 atm; R = 0.08206 L.atm/(mol.K);

for P = 1:31 (atm)

Equations of State:

**Van der Waal**:

**Redlich-Kwong**:

**Peng- Robinson**:

Hint:

1. Make P, Pc, T, Tc, and R global variables

2. Write three functions. One for each of the equations.

3. Write a script file that calls the functions using a root finding method to determine a root

4. Use the root to calculate the compressibility factor

5. Plot the compressibility factor verses pressure.

Note: Show all three graphs in the same plot window. Properly label the axis etc.