Calculate the work for the compression (kJ/mol) as well as the temperature of the exit stream.

Problem 10.12: Use the SRK equation to calculate the Pxy graph of carbon dioxide (1)/normal pentane at 250 K. For this system $k_{12} = 0.12$.
a) Plot the Pxy graph at 250 K.
b) A stream contains a mixture of the two components with overall composition $z_1 = 50\%$. The conditions are 15 bar, 250 K. What is the phase of the system?
c) The above stream is flashed isothermally to a pressure such that the vapor contains 90% carbon dioxide. Determine the pressure and the concentration of CO_2 in the liquid.

Problem 10.13: Use the SRK equation to compute a Txy graph for the system carbon dioxide (1)/normal pentane at 25 bar. Assume that $k_{12} = 0.12$ and independent of temperature.
a) Plot the Txy graph.
b) A saturated vapor-liquid stream at 25 bar with the overall composition $z_1 = 0.5$ contains 50% vapor. What are the compositions of the two phases?
c) The stream passes through a heat exchanger where it is heated until the dew point is reached. What is the temperature?
d) How much heat is exchanged in the previous step?

Problem 10.14: The table below gives data for the system hydrogen sulfide (1) in benzene (2) at 150 °C, using Peng-Robinson equation with $k_{12} = 0.015$.
a) Do you expect this system to exhibit a critical point at 150 °C?
b) Determine whether the solution behavior of benzene may be considered ideal in the concentration range $x_1 = 0$ to 0.30.   benzene
c) Explain why the fugacity coefficients of ~~H₂S~~ in the liquid and in the vapor are equal at 5.76 bar but different at 36.99 bar.

This problem should be moved to Ch 13.

x_1	y_1	P (bar)	ϕ_1^L	ϕ_1^V	ϕ_2^L	ϕ_2^V	Z^L	Z^V
0.00	0.0000	5.76	15.9442	1.0288	0.9002	0.9002	0.0171	0.8901
0.30	0.8133	36.99	2.4569	0.9062	0.1558	0.5843	0.0981	0.8105

Problem 10.15: The VLE data in the table below were obtained using the SRK equation. The system under consideration is carbon dioxide (1) and cyclohexane (2). Using only data given in this problem, answer the following questions:
a) What is the saturation pressure of cyclohexane at 250 K?
b) Calculate the solubility (mole fraction) of CO_2 in cyclohexane at 250 K under total pressure of 1 bar.