b) Calculate the bubble pressure of the two-phase system at 70 °C and the composition of the vapor.
c) Calculate the *Pxy* phase diagram at 70 °C.
Additional information: The saturation pressures of the pure components at 70 °C are

$$P_1^{\text{sat}} = 0.791 \text{ bar}, P_2^{\text{sat}} = 0.312 \text{ bar}.$$

Problem 12.21: a) Use the SRK equation to calculate the activity of oxygen in air (gas) at the dew pressure of air at 120 K.
b) Use the SRK equation to calculate the activity of oxygen in liquid air at the bubble pressure of air at 120 K.
Assume that air is a mixture of oxygen (21%) and nitrogen (79%) and that $k_{12} = 0$.

Problem 12.22: The table below shows the results from a VLE calculation for the system normal heptane (1)/normal decane (2) but because someone spilled coffee, some entries are missing.
a) Calculate the activity coefficient of n-decane at $P = 17.22$ bar, $T = 570$ K, $x_{\text{decane}} = 0.7$.
remove part (b) renumber remaining questions
~~b) Is Henry's law obeyed by n-heptane at P = 17.22 bar, T = 570 K, $x_{\text{heptane}} = 0.3$? (Answers without justification will not count.)~~
c) Is Raoult's law valid for this system at 570 K? (Answers without justification will not count.)
d) Fill out the missing information in the table. You may not fill out the table by interpolation!
e) Draw a qualitative *Pxy* graph for this system at 570 K.
f) State and justify your assumptions.

Component 1 = n-heptane; component 2 = n-decane

P (bar)	T (K)	x_1	y_1	ϕ_1^L	ϕ_1^V	ϕ_2^L	ϕ_2^V	Z_V	Z_L
11.02	570	0.00	0.000	1.912	0.938		0.765	0.685	0.093
12.99	570	0.10		1.627	0.911	0.659	0.723	0.664	0.109
13.50	570		0.217		0.905	0.638	0.713	0.659	0.114
17.22	570	0.30	0.431	1.237	0.861	0.520	0.640	0.611	0.148

Problem 12.23: The partial molar enthalpies of species 1 and 2 in a binary mixture at 25 °C are given by

$$\overline{H}_1 = 100(1 + 0.08x_2^2); \quad \overline{H}_2 = 80(1 + 0.1x_1^2),$$

where the enthalpy is in kJ/mol of mixture.