You do not need to include system diagram, assumptions, and basic equations for HW-1; these items are required for HW-2.

HW – 1(i)

Numerical values of temperature, pressure, and specific volume are given in the table below.

P = 7 bar		P = 8 bar	
T (°C)	v (m^3/kg)	T (°C)	v (m^3/kg)
50	0.21289	50	0.18461
80	0.23672	80	0.20588

(a) For P = 7 bar and T = 60°C, linearly interpolate to find specific volume, in m^3/kg.
(b) For P = 7.4 bar and T = 50°C, linearly interpolate to find the specific volume, in m^3/kg.
(c) For P = 7.4 bar and T = 60°C, linearly interpolate to find the specific volume, in m^3/kg.

HW – 1(ii)

You do not need to include system diagram, assumptions, and basic equations for this problem.
Evaluate the following integrals.

(a) $I_1 = \int_5^{10} \frac{dx}{x}$

(b) $I_2 = \int_{0.1}^{0.3} \frac{dx}{x^{1.5}}$

HW – 2

Consider the ideal gas equation of state: $PV = mRT = n\overline{R}T$

where $R = \frac{\overline{R}}{M}$ and $\overline{R} = 8.314 \frac{\text{kJ}}{\text{kmol-K}}$

HW – 2(i)

A spherical balloon of 10 m diameter is filled with helium gas (molecular weight M = 4 kg/kmol) at a temperature of 20°C and an absolute pressure of 5 bar.

(a) Calculate the mass of helium gas in the balloon, in kg.

When the balloon rises through the atmosphere, the helium gas is heated to 150°C with negligible change in the balloon volume.

(b) Find the final absolute pressure of helium gas, in bar.

HW – 2(ii)

A closed piston-cylinder system contains air (molecular weight M = 28.97 kg/kmol) at a temperature of 27°C and an absolute pressure of 100 kPa.

(a) Determine the specific volume of air, in m^3/kg.

Air in the cylinder is heated without changing its temperature until its volume doubles.

(b) Does the specific volume of air in the cylinder decrease, increase, or remain the same? Justify with equation(s).
(c) Does the pressure of air in the cylinder decrease, increase, or remain the same? Justify with equation(s).