Consider the mixing chamber shown below. Two steady streams of air enter the chamber. Stream 1 has a mass flow rate of 0.1 kg/s, and is at 100 kPa, 600 K. Stream 2 has a mass flow rate of 0.6 kg/s and is at 100 kPa, 700 K. The streams are mixed together and exit the chamber in state 3. The condition in state 3 is 100 kPa, 900 K.

1. Find the exit mass flow rate of air in kg/s.

2. Find the volumetric flow rate at the exit in $m^3/s$.

3. Find the rate of heat transferred to the mixing chamber in kW.

You may assume air to be an ideal gas. However, you may not assume $C_p$ and $C_v$ to be constant. Use the air tables to find values of internal energy and/or enthalpy.

\[ Q_{cv} \]