

## Homework for Fluid

1. Air enters a control volume operating at steady state at 1.05 bar, 300 K, with a volumetric flow rate of 12 m<sup>3</sup>/min and exits at 12 bar, 400 K. Heat transfer occurs at a rate of 20 kW from the control volume to the surroundings. Neglecting kinetic and potential energy effects, determine the power, in kW.
2. Air expands through a turbine from 10 bar, 900 K to 1 bar, 500 K. The inlet velocity is small compared to the exit velocity of 100 m/s. The turbine operates at steady state and develops a power output of 3200 kW. Heat transfer between the turbine and its surroundings and potential energy effects are negligible. Calculate the mass flow rate of air, in kg/s, and the exit area, in m<sup>2</sup>.