Given:
Steam enters an adiabatic turbine at 5 MPa and 450°C and leaves at a pressure of 1.2 MPa.

Required:
Determine the work output of the turbine per unit mass of steam if the process is reversible.

Solution:
The inlet pressure and temperature are defined as

$$P_{in} := 5\ \text{MPa} \qquad T_{in} := 450\ °\text{C} = 723.15\ \text{K}$$

The outlet pressure is defined as

$$P_{out} := 1.2\ \text{MPa}$$

1st Law (for steady state, adiabatic device with no ΔKE and ΔPE)

$$\frac{d}{dt} E_{sys} = \Sigma E'_{in} - \Sigma E'_{out}$$

$$0 = m' \cdot h_{in} - m' \cdot h_{out} - W'_{out}$$

Solving for the specific work out shows

$$w_{out} = h_{in} - h_{out}$$

Going to Table A-5 @ $P_{in} = 5000\ \text{kPa}$ shows

$$T_{sat} := 263.94\ °\text{C}$$

Since $T_{in} > T_{sat}$, the state is superheated. Going to Table A-6 @ $P_{in} = 5.000\ \text{MPa}$ & $T_{in} = 450.0\ °\text{C}$ shows

$$h_{in} := 3317.2\ \frac{\text{kJ}}{\text{kg}} \qquad s_{in} := 6.8210\ \frac{\text{kJ}}{\text{kg K}}$$

Since the process is adiabatic and reversible, it is isentropic. Thus $\Delta s = 0$ and

$$s_{out} := s_{in} = 6.821\ \frac{\text{kJ}}{\text{kg K}}$$

Going to Table A-5 @ $P_{out} = 1200\ \text{kPa}$ shows

$$s_g := 6.5217\ \frac{\text{kJ}}{\text{kg K}}$$

Since $s_{out} > s_g$, the state is superheated. Gong to Table A-6 @ $P_{out} = 1.200\ \text{MPa}$ & $s_{out} = 6.821\ \frac{\text{kJ}}{\text{kg K}}$ shows that interpolation is needed. This is shown below.

$$s_a := 6.5909\ \frac{\text{kJ}}{\text{kg K}} \qquad s_b := 6.8313\ \frac{\text{kJ}}{\text{kg K}}$$

$$h_a := 2816.1\ \frac{\text{kJ}}{\text{kg}} \qquad h_b := 2935.6\ \frac{\text{kJ}}{\text{kg}}$$

$$h_{out} := \frac{s_{out} - s_a}{s_b - s_a} \cdot \left(h_b - h_a\right) + h_a = 2930\ \frac{\text{kJ}}{\text{kg}}$$

The specific work out of the device is then

$$\boxed{w_{out} := h_{in} - h_{out} = 386.7\ \frac{\text{kJ}}{\text{kg}}}$$