Max Shi E234 Exam 2.

I pledge my honor that I have abided by the Stevens Honor System.

1. @ $\dot{m} = \rho V A = 0.903 \frac{kg}{s}$ saturated liquid $\Rightarrow \rho = \frac{1}{v} = \frac{1}{0.0008700^2}$

1149.425 kg/m^3

$A = \left(\frac{0.01}{2}\right)^2 \times \pi = 0.0000785 \text{ m}^2$

$V = 10 \text{ m/s}$

(b) $h_2 \cong h_1$ in a throttling valve.

$h_1 = 107.34 \text{ kJ/kg} = h_2$ & h_f @ 1000 kPa $= 107.34 \text{ kJ/kg}$.

@ 0.2 mPa, $h_f = 38.41$, $h_g = 244.50$

$h_f \leq h_2 \leq h_g \Rightarrow$ mixture

$$x = \frac{h_2 - h_f}{h_{fg}} = \frac{107.34 - 38.41}{206.09} = 0.334$$

(c) $Q_{out} + \dot{m}_{in}(h_{in}) = \dot{m}_{out}(h_{out})$

$\dot{m} = 0.903 \text{ kg/s}$ $h_{out} = 38.41 + (0.1)(206.09) = 59.019 \text{ kJ/kg}$

$h_{in} = 107.34 \text{ kJ/kg}$

$Q_{out} = 0.903(107.34 - 59.019)$

$= 44.12 \text{ kJ/s}$. must be removed.