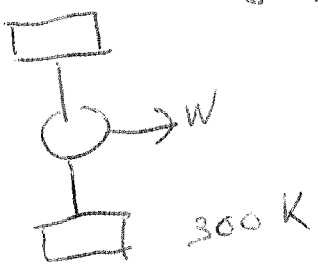


b.1)



$$\oint \frac{\delta Q}{T} = -\sigma_{cyclus}$$

$$\oint \frac{\delta Q}{T} = \frac{Q_H}{T_H} - \frac{Q_C}{T_C}$$

$$\eta = \frac{W_C}{Q_H} = \frac{Q_H - Q_C}{Q_H} = 1 - \frac{Q_C}{Q_H}$$

$$Q_C = (1 - \eta) Q_H$$

$$\oint \frac{\delta Q}{T} = \frac{Q_H}{T_H} - \frac{(1 - \eta) Q_H}{T_C} = Q_H \left(\frac{1}{T_H} - \frac{1 - \eta}{T_C} \right) = 1000 \left(\frac{1}{500} - \frac{1 - 0,67}{300} \right) = 0,67 \text{ kJ/K}$$

$$\sigma = -0,67 \text{ kJ/K}$$

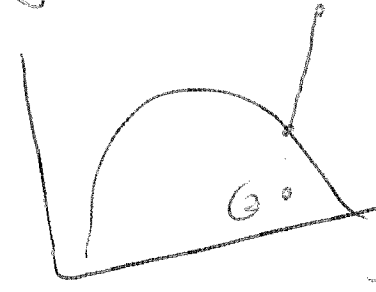
$\eta = 0,4$ etc

6.7 a) ja b) nee c) ja d) nee e) ja

6.9) a) nee b) nee c) nee d) nee e) nee f) ja g) nee

6.20 R22 1kg $S_2 - S_1 = -0,55 \text{ kJ/kgK}$

T Ag $S_1 = 1,0789 \text{ kJ/kgK}$
 $S_2 = 0,529 \text{ kJ/kgK}$

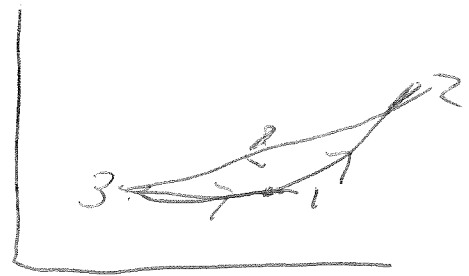
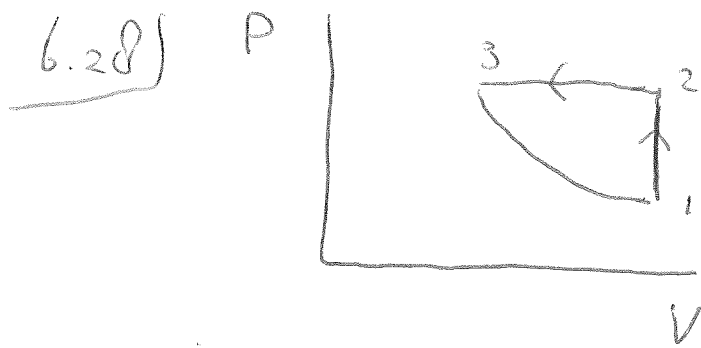


by 0.6 bar $T_{sat} = -51,4^\circ\text{C}$

$$x = \frac{0,529 - (-0,0542)}{1,03 - -0,0542} = 0,54$$

$$h = h_f + x h_g = -12,35 + 0,54 \cdot 240 = 1$$

Tabel



$$V_1 = 0,02 \text{ m}^3 \quad m = 0,0242 \text{ kg} \quad P_1 = 1 \cdot 10^5 \text{ Pa}$$

$$PV = mRT \quad T_1 = \frac{P_1 V_1}{mR} = \frac{1 \cdot 10^5 \cdot 0,02}{0,0242 \cdot \frac{8314}{29}} = 288 \text{ K}$$

$$\frac{P_2}{T_2} = \frac{P_1}{T_1} \quad T_2 = P_2 \cdot \frac{T_1}{P_1} = \frac{4,2}{1,0} \cdot 288 = 1211 \text{ K}$$

$$\begin{aligned} \Delta s_{21} &= \int_1^2 \frac{c_p}{T} dT - R \ln\left(\frac{P_2}{P_1}\right) = c_p \ln\left(\frac{T_2}{T_1}\right) - R \ln\left(\frac{P_2}{P_1}\right) \\ &= 1 \cdot 10^3 \cdot \ln\left(\frac{1211}{288}\right) - \frac{8314}{29} \ln\left(\frac{4,2}{1}\right) \\ &= 1025 \text{ kJ/kgK} \end{aligned}$$

$$\Delta s' = m s \quad \Delta s' = 0,0242 \cdot 1025 = 0,25 \text{ kJ/K}$$

$$2 \rightarrow 3 \quad T_3 = T_1$$

$$\Delta s_{23} = c_p \ln\left(\frac{T_3}{T_2}\right) + 0 = \ln \frac{288}{1211} \cdot 1 \cdot 10^3$$

$$\Delta s'_{23} = 0,0242 \cdot \ln \frac{288}{1211} \cdot 10^3 = -0,0344 \text{ kJ/K}$$

$$3 \rightarrow 1$$

$$\delta Q = T ds = 0 \quad ds = 0$$

$$\Delta s_{31} = 0$$