Irrev, øving 2 (2. Forsøk)

2a) From last:

$$\sigma = J_q' \frac{\partial}{\partial x}\left(\frac{1}{T}\right) - \frac{J_i}{T}\left(\frac{\partial \mu_{i,T}}{\partial x} + F z_i \frac{\partial \phi}{\partial x}\right) + r\left(-\frac{\Delta_r G}{T}\right)$$

Assuming $dT = 0$ and ($z_i = 0$ or $d\phi = 0$) and ($r = 0$ og $\Delta_r G = 0$)

$$\underline{\underline{\sigma = -\frac{J_i}{T}\frac{\partial \mu_{i,T}}{\partial x}}}$$

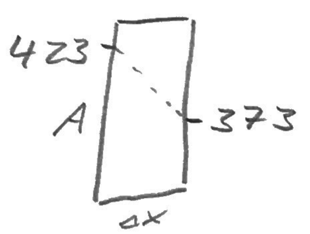
6) From last:

Calculated $\frac{dS_{irr}}{dt}$ for the heat flux from the bottom of the pan to the surroundings

$$w_{lost} = T_a \frac{dS_{irr}}{dt} = 293\,K \cdot 37{,}8 \frac{J}{Ks} = \underline{11{,}08\,kW}$$

If only viewing the bottom of the pan

$$\sigma = J_q' \frac{\partial}{\partial x}\left(\frac{1}{T}\right), \quad J_q' = -\lambda \frac{\Delta T}{\Delta x}, \quad \text{For steady state}$$



$$\frac{dS_{irr}}{dt} = A\int_0^l \sigma\, dx = -A\lambda \frac{\Delta T}{\Delta x}\int_0^l \frac{\partial}{\partial x}\left(\frac{1}{T}\right)dx$$

$$= -A\lambda \frac{\Delta T}{\Delta x}\int_{423}^{373} \frac{\partial}{\partial T}\left(\frac{1}{T}\right)dT$$

$$= -A\lambda \frac{\Delta T}{\Delta x}\left(\frac{1}{373} - \frac{1}{423}\right) = \underline{11{,}27 \frac{J}{sK}}$$

$$\underline{\underline{w_{lost} = T_a \frac{dS_{irr}}{dt} = 3{,}3\,kW}}$$