Correction to the solution of sheet 11, exercise 4 b)

(In the calculation of the efficiency, the contribution to ΔQ_{in} during the isochoric heating was missing.) ☐ = missing in old solution

$$\rightarrow \Delta W_{ab} = \int_a^b P\,dV = \int_{V_1}^{V_2} \frac{NkT_1}{V}\,dV = NkT_1 \ln\left(\frac{V_2}{V_1}\right)$$

$$\Delta W_{bc} = \Delta W_{da} = 0$$

$$\Delta W_{cd} = NkT_2 \ln\left(\frac{V_1}{V_2}\right)$$

$$\left.\begin{aligned} \Delta Q_{ab} &= \Delta W_{ab} \\ \boxed{\Delta Q_{da} = \frac{3}{2} Nk(T_1 - T_2)} \end{aligned}\right\} \Rightarrow \Delta Q_{in} = \Delta Q_{ab} \boxed{+ \Delta Q_{da}}$$

$$\Rightarrow \eta = \frac{\Delta W}{\Delta Q_{ab} \boxed{+ \Delta Q_{da}}} = \frac{Nk(T_1 - T_2)\ln\left(\frac{V_2}{V_1}\right)}{NkT_1 \ln\left(\frac{V_2}{V_1}\right) \boxed{+ \frac{3}{2} Nk(T_1 - T_2)}}$$

$$= \frac{T_1 - T_2}{T_1 \boxed{+ \frac{3(T_1 - T_2)}{2\ln\left(\frac{V_2}{V_1}\right)}}} < \eta_C$$