

$$1) a) \sum_n e^{-\frac{nh\nu}{kT}} = \frac{1}{1 - e^{-\frac{h\nu}{kT}}}$$

$$z_N = z_i^N = \left( \frac{1}{1 - e^{-\frac{h\nu_i}{kT}}} \right)^N$$

3) a)  $Q_0$  za 60 s

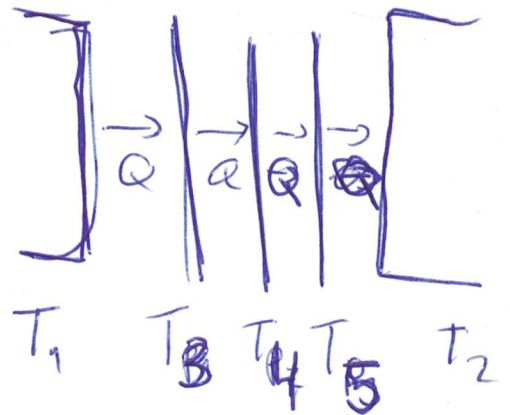
$$Q_0 = (L_2 - L_1)t = \sigma S (T_2^4 - T_1^4) \cdot t = \underline{\underline{112,3 \text{ kJ}}}$$

b)  $Q = \sigma S (T_3^4 - T_1^4) \cdot t$

$$Q = \sigma S (T_4^4 - T_3^4) \cdot t$$

$$Q = \sigma S (T_5^4 - T_4^4) \cdot t$$

$$Q = \sigma S (T_2^4 - T_5^4) \cdot t$$



$$4Q = \sigma S (T_3^4 - T_1^4 + T_4^4 - T_3^4 + T_5^4 - T_4^4 + T_2^4 - T_5^4) \cdot t$$

$$= \sigma S (T_2^4 - T_1^4) \cdot t$$

$$\underline{\underline{Q = \frac{Q_0}{4} = 28,075 \text{ kJ}}}$$

$$T_4 = \sqrt[4]{\frac{Q_0}{4\sigma S t} + T_3^4} = \underline{\underline{353,62 \text{ K}}}$$

$$T_5 = \sqrt[4]{\frac{Q_0}{4\sigma S t} + T_4^4} = \underline{\underline{374,94 \text{ K}}}$$

c)  $(T_3^4 - T_1^4) \cdot S = \frac{Q_0}{4 \cdot t}$

$$T_3^4 - \frac{Q_0}{4 \cdot t \cdot S} = T_1^4 \Rightarrow T_3 = \sqrt[4]{\frac{Q_0}{4 \cdot t \cdot S} + T_1^4} = 327,55 \text{ K}$$