4.6. Entropy

4.6a Consider contacts 1 and 2 held at two different temperatures $T_1 > T_2$. If an energy $E$ is transferred from 1 to 2, the overall increase in entropy is

(a) $E \left( \frac{1}{T_1} + \frac{1}{T_2} \right)$

(b) $E \left( \frac{1}{T_1} \frac{1}{T_2} \right)$

(c) $E \left( \frac{1}{T_2} \frac{1}{T_1} \right)$

(d) $\frac{E}{T_1 T_2}$

(e) None of the above

4.6b The entropy $S$ is related to the number of microscopic states $W$ by $S = k \ell n W$. If the contacts consist of $N$ electrons freely moving in $d$ dimensions, the quantity $W$ is given by

(a) $W \sim E^{(d/2)}$ 1

(b) $W \sim E^{(Nd/2)}$ 1

(c) $W \sim E^{(d/2)+1}$

(d) $W \sim E^{Nd}$ 1

(e) None of the above