Svar till tentamen i termodynamik och statistisk fysik för F3, 97-12-19

1: $P_{\mathrm{ut}} \propto v^3 \exp(-mv^2/2k_{\mathrm{B}}T)$

2: $\overline{(v_x + av_y)^2} = \frac{k_{\mathrm{B}}T}{m}(1 + a^2)$

3: $f(T) = T^4$

4: $C_{v,el} \approx \frac{3}{2} N \frac{k_{\mathrm{B}}^2}{\epsilon_{\mathrm{F}}} T$

5: $\Delta\epsilon \ll k_{\mathrm{B}} T_b$

6: $T_2 = \frac{3}{4} T_1$

7: $\frac{D_{\mathrm{e}}}{D_{\mathrm{i}}} = 6.9$

8: $C_{\mathrm{V}}(\epsilon) = k_{\mathrm{B}} \left(\frac{\epsilon}{k_{\mathrm{B}}T}\right)^2 \frac{e^{\beta\epsilon}}{(1+e^{\beta\epsilon})^2}$
$\overline{C_{\mathrm{V}}} = \frac{k_{\mathrm{B}}^2 T}{\epsilon_0} \int_{-\epsilon_0/2k_{\mathrm{B}}T \ll -1}^{\epsilon_0/2k_{\mathrm{B}}T \gg 1} x^2 \frac{e^x}{(1+e^x)^2} dx \propto T$

9: $\epsilon_{\mathrm{F}} = c\hbar(6\pi^2 N/V)^{1/3}$
$p = \frac{1}{4}\frac{N}{V}\epsilon_{\mathrm{F}}$