

Statistical Mechanics and Thermodynamics
Homework for Weeks 8 and 9
Due Wednesday, 17 March, 2004

Reading: Fermi chapters III and IV and K&K chapter 8. Much of Mandl chapter 5 will be helpful.

1. Fermi: the three problems on page 45.
2. In a footnote on page 30, Fermi offers an example of an engine, operating only at a single temperature, that extracts mechanical work from heat. He points out that this does not violate Kelvin's formulation of the Second Law. (a) Explain explicitly why this effect cannot be used to generate electricity for free in a commercial process without any source of energy (such as burning fuel). (b) Write a similar footnote for Clausius's formulation, giving an example of a process that results in the transfer of heat from one body to a hotter body.
3. K&K 7.8
4. K&K 7.11
5. K&K 7.12
6. K&K 8.1
7. K&K 8.5
8. K&K 8.6