

PH421 - Thermal and Statistical Physics

Assignment 6 - Feb 6, 2008

1. Irreversibility of temperature equalization.

Consider a system initially at T_1 , placed in contact with a heat bath at T_0 . Assume that the heat capacity C of the system is constant. Show that the process of temperature equalization is *always* irreversible, for any value of $T_1 \neq T_0$.

2. Non-isothermal compression of an ideal gas

Consider one mole of an ideal gas at temperature T is being compressed from V_1 to V_2 . The compression occurs in two stages:

- (1) Compression from V_1 to V_2 at constant pressure; during this stage, the system is in contact with a heat bath at T' ;
- (2) temperature increase back to T , at constant volume; during this stage, the system is in contact with a heat bath at T .

Show that this is an *irreversible* process.

3. Problem 4.2 from textbook

4. Problem 4.3 from textbook

5. Problem 4.7 from textbook