## PHYS 328 HOMEWORK #9

Due: 8 Nov. 2012

1. Inspired by the first problem of the last homework set :

Solve the differential equation (without using Mathematica or other software programs) :

$$\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{1}{x+y}$$

The inspiration does not derive from the content of the question, but from seeing how a simple algebraic "trick" can turn a seemingly difficult problem into a simple one. What simple "trick" can you do to turn this into an almost trivial ODE?

2. 3.34, parts a) - e). 5 pts for a), b), c), e); 10 pts for d)

3. Suppose the cycle represented in the first homework of the last problem set consisted of two adiabatic steps separated by constant volume steps (i.e., steps  $1 \rightarrow 2$  and  $3 \rightarrow 4$  are adiabatic instead of isothermal). Determine an expression for the efficiency of this cycle. You should be able to express your final answer in terms of V and  $\gamma$ . (this is an Otto engine and you can read about it in section 3 of chapter 4).

## 4. 5.10 from the text

5. 5.12 from the text; derive only the relationship :

$$\left(\frac{\partial \mathbf{T}}{\partial \mathbf{V}}\right)_{\mathrm{S}} = -\left(\frac{\partial \mathbf{P}}{\partial \mathbf{S}}\right)_{\mathrm{V}}$$

6. Problem 6.6 in text.

7. Problem 6.12 in text.