

# Suspensions and polymer solutions

## Exercise 7

8 Januray 2007

1. In many applications a polymer in solution is physically adsorbed on a solid surface due to short-range attraction between the monomers and the surface. Assume that the energy of the monomer–surface attraction is  $-V_0$  and its range is comparable to the monomer size  $a$ . Use scaling arguments to calculate the following:
  - (a) The thickness of the “cushion” that the adsorbed polymer makes adjacent to the surface. If  $|V_0| > kT$ , will the thickness be larger or smaller for a real chain as compared to an ideal chain? How can you rationalize this result?
  - (b) The free energy of polymer adsorption. (Note the resulting non-trivial dependence of the free energy on temperature.)
2. Using scaling arguments calculate the free energy of a polymer squeezed into a tube of diameter  $A$ ,  $a \ll A \ll R$ .