

M01T.2—Polymer Chain

Problem

A certain polymer is a chain of N molecules that touch each other. Each molecule can exist in two states of lengths a and b , associated with corresponding internal energies E_a and E_b . We will assume that there is no interaction energy between the molecules. Use the constant tension canonical ensemble to calculate the canonical partition function. Derive a formula for the length of the polymer as a function of the inverse temperature and tension.