

**Department of Physics  
University of Maryland  
College Park, MD 20742-4111**

**Physics 704**

**HOMEWORK ASSIGNMENT #6**

Spring 2006

Due Thursday, May 11; deadline Monday May 15 (noon).

Exercises:

1. Show that, for a system such as the XY model, the specific heat does not diverge, and in fact has no observable singular behavior, at the Kosterlitz-Thouless transition at  $T_{KT}$ .
2. In the posted Jarzynski article, he notes that it is a simple exercise to show that

$$\langle \exp(-\beta W) \rangle = \exp(-\beta \Delta F)$$

is equivalent to the cumulant expansion

$$\Delta F = \Delta F = \sum_{n=1}^{\infty} (-\beta)^{n-1} \frac{\omega_n}{n!} \quad , \quad \text{where } \omega_1 = \langle W \rangle, \quad \omega_2 = \langle (W - \langle W \rangle)^2 \rangle, \quad \text{and find } \omega_3.$$

3. Work through the details of the transformation from the discrete Gaussian model to the Coulomb gas model.

*Hints to be provided.*