Physics 115A **Spring 2001**

Statistical Physics **due 12:30 pm Thursday, April 12**

PROBLEM SET 1

Reading: Chapter 1 (especially sections 1.1-1.6 and last paragraph of page 39) and Chapter 2 in Reif.

Hint: Notice that there are *many* helpful mathematical appendices in Reif.

1. Show explicitly that the following identities are correct for the Gaussian function

$$P(x)dx = \frac{1}{\sqrt{2\pi}\sigma} e^{-(x-\mu)^2/2\sigma^2} dx$$

   (a) Normalization

$$\int_{-\infty}^{\infty} dx P(x) = 1$$

   (b) Mean or average value

$$\mu = \int_{-\infty}^{\infty} dx P(x) x$$

   (c) Variance or second moment of the distribution

$$\sigma^2 = \overline{(x-\mu)^2}$$

2. Reif 1.9

3. Reif 1.10

4. Reif 1.11

5. Reif 2.1