Date: Thursday, November 9

Instructions: You may utilize notes and problem set solutions (both your solutions and the posted solutions). You may not, however, discuss the problems with others.

Problem 1:	/	12
Problem 2:	/	15
Problem 3:	/	16
Problem 4:	/	30
Problem 5:	/	27
Total:	/	100

Equations you may find useful:

$$1 = \int_{-\infty}^{\infty} dx\, \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)$$

$$\mu = \int_{-\infty}^{\infty} dx\, \frac{x}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)$$

$$\sigma^2 = \int_{-\infty}^{\infty} dx\, \frac{(x-\mu)^2}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)$$

$$P(\nu) = \frac{e^{-\beta E(\nu)}}{Q(\beta)} \quad \text{[Canonical]}$$

$$S = k_{\mathrm{B}} \ln \Omega$$

$$-\beta A = \ln Q \quad \text{[Canonical]}$$

$$\beta = \frac{1}{k_{\mathrm{B}} T} = \frac{1}{k_{\mathrm{B}}} \left(\frac{\partial S}{\partial E}\right)_{N,V}$$

$$C_V = \left(\frac{\partial \langle E \rangle}{\partial T}\right)_{N,V}$$

$$Q(\beta) = \sum_{\nu} e^{-\beta E(\nu)} \quad \text{[Canonical]}$$

$$\ln n! \approx n \ln n - n$$

$${}_M C_N = \frac{M!}{N!(M-N)!}$$

This course has ended, so the exams and solutions have been removed. If you have a good reason to want access, please email Todd.