Quiz 13

Question:	1	2	Total
Points:	20	5	25
Score:			

Name: _____

1. Consider a system with three energy levels as described in the table below. Assume the system has Boltzmann-weighted probabilities $(p(\epsilon) \propto e^{-\epsilon\beta})$.

ϵ	g
0	1
ϵ_0	1
$2\epsilon_0$	γ

(a) (5 points) Write an expression for the partition function q as a function of energy, degeneracy, and temperature.

$$q =$$

(b) (5 points) What is an expression for the average energy? This can be left as a (simplified) function of q.

$$\langle \epsilon \rangle =$$

(c) (5 points) At what temperature will the probabilities of the first and third energy levels be the same (i.e., $p_1^* = p_3^*$). T will be a function of ϵ_0 and γ.

$$T =$$

(d) (5 points) For $\epsilon_0 = \ln(2)/\beta$ and $\gamma = 2$, compute the equilibrium probabilities of the three energy levels.

$$p_1^* =$$

$$p_2^* =$$

$$p_3^* =$$

2. (5 points) For fun if you have time: What could Thomas as the teaching fellow for the course have done better?