1) Kardar 1.11

2) Consider the two-dimensional phase space of a classical plane rotor. Divide up the phase space into cells of “volume” $\hbar$ by drawing lines of constant energy. What are the (approximate) energies of the states assigned to these cells? Compare them to the energy eigenvalues of the corresponding quantum mechanical rotor.

3) By evaluating the “volume” of the relevant region of its phase space, show that the number of microstates available to a rigid rotor with angular momentum $\leq M$ is $(M/\hbar)^2$. Hence determine the number of microstates that may be associated with the quantized angular momentum $M_j = \sqrt{j(j+1)}\hbar$, where $j = 0, 1, 2, \ldots$ or $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}, \ldots$.

4-5) Kardar 4.1, 4.2 (not graded, solution provided)