Fermi-Dirac Quantum Gas Problem 1: $\mu$ and $n_0$ and $n_1$ for a small number of particles

Using the programs that you’ve written for quantum gases, carry out the following calculations for Fermi-Dirac statistics.

1. For the extreme cases of $N = 1, 2, 3,$ and $4$, compute the chemical potential $\mu$ and the occupations of the two lowest energy states as functions of the temperature.

Don’t include temperatures below $T = 0.1$ in your computations. There are numerical difficulties at very low temperatures that are not worth worrying about for this assignment.

Go up to about $T = 3.0$ for $N = 1$, $T = 5.0$ for $N = 2$ and $3$, and $T = 7.0$ for $N = 4$.

2. Are the Fermi energies you found in your computations consistent with what you had expected? Explain.

3. Explain the occupation number you found in your computations at low temperatures for a state with energy $\epsilon = 6A$ for $N = 2$ and $N = 3$. 
